TOY SOLDIERS | FINDS IN THE GALÁPAGOS | TELLING TEXTILES

ROTUNDA

THE MAGAZINE OF THE ROYAL ONTARIO MUSEUM

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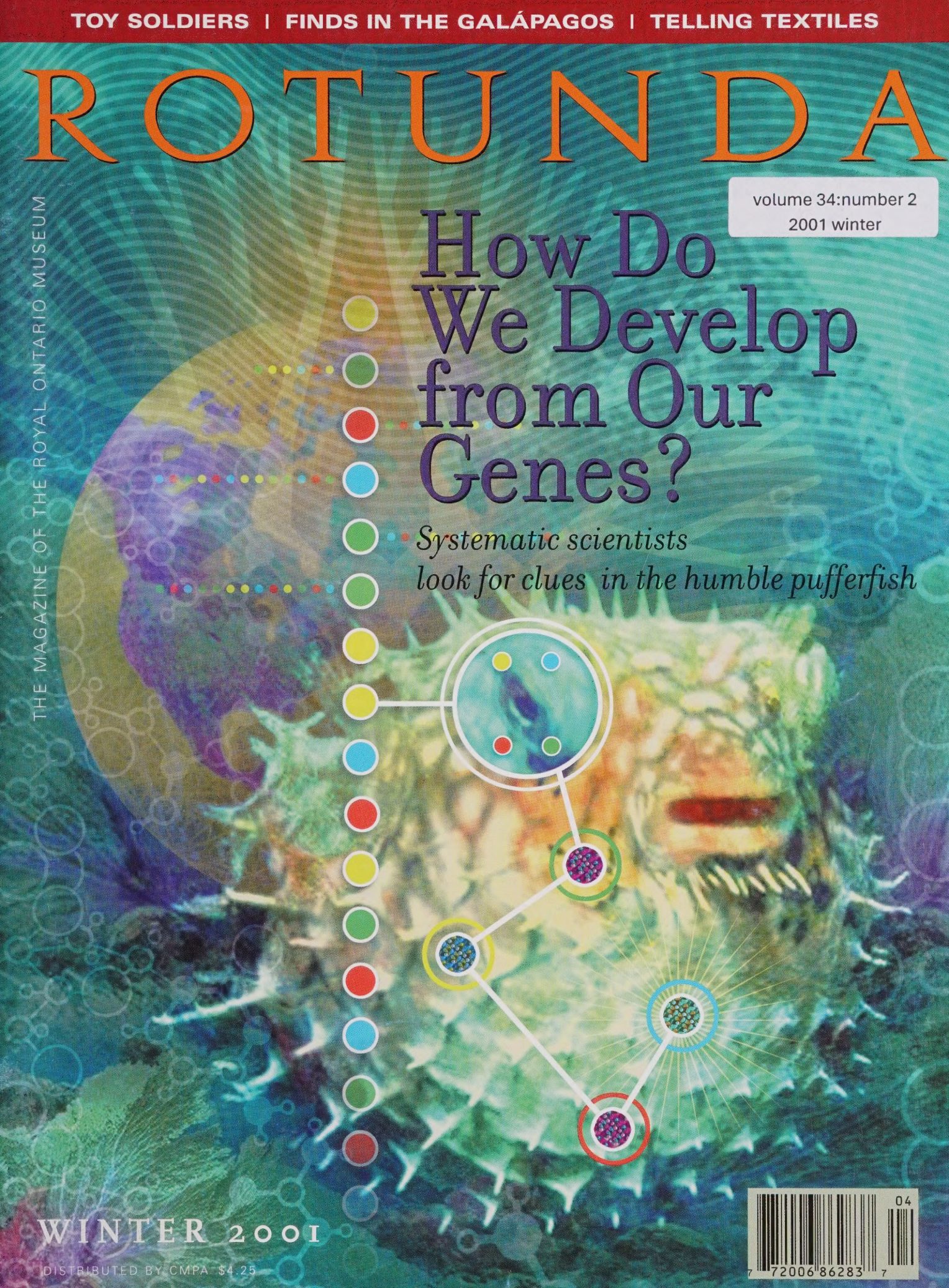
2001 winter

How Do We Develop from Our Genes?

Systematic scientists look for clues in the humble pufferfish



WINTER 2001

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Jean Paul Riopelle, *Abstract Composition*, 1951, 18" x 13" oil on canvas, private collection, Calgary

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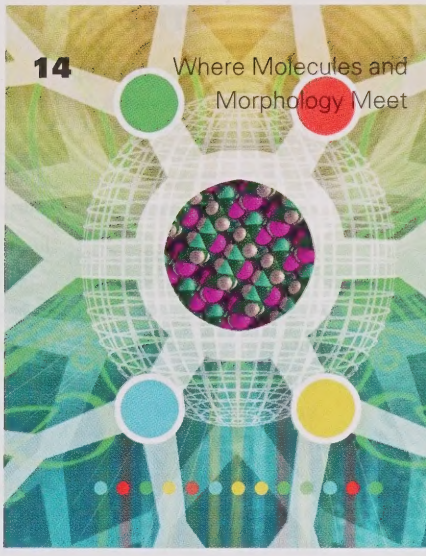

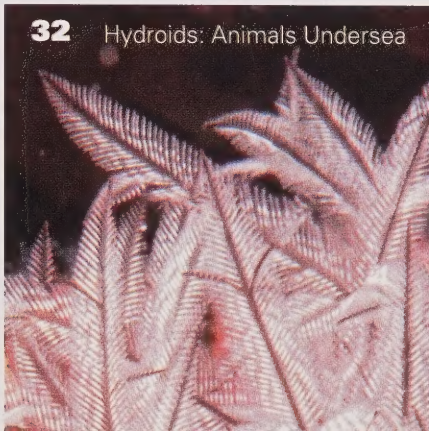

COVER IMAGE: PAUL WATSON

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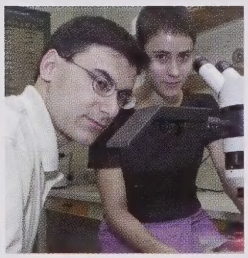


Francesco Santini

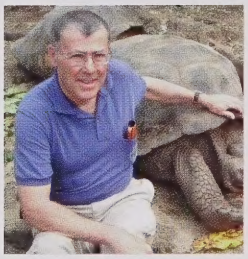
Centre for Biodiversity and Conservation Biology

FRANCESCO ("Systematic Perception") is a graduate student in the Department of Zoology, University of Toronto, and in the ichthyology section of the ROM. Born in Italy, he is finishing his Ph.D. in zoology, specializing in the evolution of deep-sea fishes. His main interest is the study of processes that have led to the evolution of marine biodiversity using systematics, paleobiology, biogeography, and evolutionary developmental biology.

Sara T. Scharf

Centre for Biodiversity and Conservation Biology

SARA ("Systematic Perception") is a graduate student at the Institute for the History and Philosophy of Science and Technology, University of Toronto. As a former research assistant and now a volunteer in the ROM's botany division, she has a lively interest in systematics and in communicating scientific ideas to the public.



Dale Calder

Centre for Biodiversity and Conservation Biology

DALE ("Treasured Islands") is a senior curator in the ROM's Centre for Biodiversity and Conservation Biology. A native New Brunswicker, he arrived at the Museum in 1981 after 12 years of working as a marine scientist in the United States. His research and collecting activities involve hydroids, a little-known group of invertebrate animals related to corals. One focus has been on biodiversity of open-ocean ecosystems, especially those of remote oceanic islands. If all goes according to plan, Hawaii is next!

K. Corey Keeble

Department of Western Art and Culture

COREY ("Soldiering On"), curator of decorative arts at the ROM, is a recognized authority on the history of Renaissance and Baroque bronze sculpture and European arms and armour. He is author of *The H. N. R. Jackman Collection of Toy Soldiers in the Royal Ontario Museum*.

Starr Siegele

1999/2000 Veronika Gervers Fellow

AS THE SAMUEL H. KRESS Foundation Research Scholar at the Metropolitan Museum of Art, Starr ("Tales in Textiles") is exploring connections between early printed works on paper and cloth. Before The Art Institute of Chicago lured her into the world of printed textiles in the mid-1990s, she served on the curatorial staffs for prints and drawings at the Cleveland Museum of Art, the National Gallery of Art in Washington, DC, and the Philadelphia Museum of Art. She is also the Allentown Art Museum's adjunct curator of prints.

PRESIDENT'S MESSAGE

CHOOSING THE RIGHT architect with the right vision for the Royal Ontario Museum at this stage in its history is important for a host of institutional reasons, but for one other reason as well: The ROM has a responsibility to Toronto and Ontario to revive a high standard of excellence in building Canada's national city.

It is humbling to recall the fine record of city-building that emerged from the generation that inhabited Toronto in the 1950s and 1960s. Often dismissed as dull and provincial, this generation was the one that built the subway and then used an international competition to choose a wonderful architect for its brave and dramatic new city hall. It was this generation that built bank towers designed by Mies van der Rohe and I. M. Pei, that built Ontario Place and the Ontario Science Centre, the CN Tower, Queen's Quay Terminal, and the Eaton Centre.

All over Toronto, there was evidence of creativity and the very best in design and execution of public and private buildings. Toronto even created an urban design division within its planning department to enhance the quality of sidewalks, lamp standards, and pocket parks.

In the past 20 years, we have not kept pace or faith with this earlier vision of Toronto, "North America's New Great City," as *Fortune* magazine described Toronto in the 1970s. Despite some good economic times since 1980, the quality of our city-building has declined, and indeed many of the best things we inherited from the past have been allowed to deteriorate.

Meanwhile, major cities in the United States and Europe have experienced a revival, and have surpassed Toronto in contemporary development. From Barcelona to Boston, Berlin to Chicago, once-troubled cities are fine again and become finer every day.

The ROM commands perhaps the best piece of real estate in downtown Toronto at the corner of Queen's Park and Bloor Street. And like many other institutions, the ROM has struggled for almost two decades to sustain its facilities and programs in the face of declining real budgets.

BRIAN BOYLE, ROM

Now, the ROM intends to transform its galleries and facilities and emerge again in the first rank of international museums, partnering with other Toronto cultural institutions in the process. It must do so if it is to generate the paid attendance required to support its operations at acceptable levels of quality.

Part of this is creating superb new architecture that will reorient the ROM with a new entrance on Bloor Street; replace the closed planetarium with a beautiful new building for theatre, cinema, and academic purposes; open the Museum subway into the concourse of the ROM and the University of Toronto; and create lovely new public spaces and squares. All this will serve the ROM's purposes to be sure, but it is equally as important in serving the city's.

A brilliant architectural achievement on this conspicuous corner will help to change the paradigm for city-building in Toronto. It will revive our aspirations and set a higher standard for things to come in many other quarters. Indeed, Toronto's major cultural institutions are all planning exciting new facilities that could collectively shake the city out of its fatigue and re-establish faith with the generation that came before.

The ROM's Architect Selection committee has identified 12 of the world's leading architects to describe their visions for this precinct of Toronto, and is moving to select three of the 12 to present more detailed presentations in mid-January. The presentations will be public because the public interest is so clearly and broadly affected by what the ROM does through its Master Plan. The ROM has always been a visible part of the broader community in Ontario and Canada, and will be much more visible still as part of the renaissance of Toronto itself.

BRIAN BOYLE, ROM / 909.80.681 / 971.165.35 / 910.34.2

The Sacred Sistrum

Making music fit for a goddess

FOR MORE than 3000 years, Hathor inspired the devotion of ancient Egyptians, who adorned their musical instruments with images of this pre-Dynastic goddess of love, music, and joy. The sistrum, two examples of which are shown above (now missing their cross-strings), was considered Hathor's sacred instrument. Its soft rattling sound was believed to soothe the goddess. The rattle's shape was fashioned after the ankh—the symbol of life. It is the only known instrument indigenous to Egypt and may have evolved from the ancient practice of shaking papyrus flowers, also a symbol of Hathor.

—Leslie-Ann Boctor

JULIE ANDERSON

History Underfoot

Local Workers in Sudan Discover Unusual Ancient Tomb

WHILE EXPLORING the ancient ruined city of Dangeil in Sudan, ROM associate archaeologist Julie Anderson and Salah M. Ahmed of Khartoum's National Corporation for Antiquities and Museums were asked to conduct immediate rescue excavations in the neighbouring village of El Fereikha. Local workers digging a trench there to lay a modern water pipe had cut through a post-Meroitic tomb shaft dating to the 4th to 5th century AD. Above the tomb, on the earth's surface, no tumulus or other evidence suggested the tomb's presence. Considering the modern construction activity, though, this was not really a surprise. The shaft descended 3 metres (almost 10 feet) at a steep angle. At the bottom, the two archaeologists crawled through a small 90 cm- (3 foot-) high entrance into an oval tomb chamber, 5 x 2 metres (16½ x 6½ feet) in size. Although much of the original fill in the shaft had been disturbed, as luck would have it the tomb chamber and its contents were found intact, including the powdery remains of an adult male and a child. Arranged in a semicircle around the adult was everything he would need for the afterlife—two beer jars, serving dishes, a large spouted bowl, a black libation bottle, the negative impression of two bows, arrowheads, a censer, and two pot stands, one of them decorated with a band of uraei, or cobras. The tomb's structure was extremely unusual: two parallel shafts, a northern one and a southern one, entered the tomb. The modern water pipe had bisected the southern shaft; the northern entrance remained sealed with red bricks. Very few other double-shaft tombs have ever been discovered. They appear to be unique to this region of the Nile.

—Julie Anderson

TIONS

THADDEUS WATKINS / 999.27.1-3

BRIAN BOYLE, ROM

Paper Vogue

A New Twist on Narrating Fashion's History

SEVEN YEARS AGO when artist Isabelle de Borchgrave and I were at an exhibition of fashion costume in New York, Isabelle made a bold proposal: that we build our own costume exhibition, one that could help people understand clothes in a different way. Her idea was to tell the story of costume through fashions made entirely of paper. As an artist, Isabelle often works in paper—and it is an inexpensive way to create illusions. As a fashion costumer and costume restorer I quickly agreed to become her accomplice. Today, our collection has grown to some 35 paper dresses, which have been seen in Mulhouse, France; Paris; New York; Boston; and London. For *Papiers à la Mode*, an exhibition of the dresses now on display at the ROM, we chose to create a dress inspired by a beautiful sleeveless bodice and petticoat c. 1700 from the ROM's collection. An English ensemble, the original is elaborately embroidered in multicoloured silk, gold, and silver threads on a quilted linen fabric. I fashioned the pieces from drafting paper, and Isabelle painted the background in a cream and white vermicelli pattern. She hand-painted an exquisite floral and foliate design on bodice and skirt, adding a scalloped pattern to the hemline. I assembled the garment with bookbinders' glue, first perforating the outlines of the floral pattern with a sharp tracing wheel to resemble the lines of the quilting.

—Rita Brown

BRIAN BOYLE, ROM / 3816

No Penalty for Slashing

Sabres' big teeth didn't get in the way of a good meal

THE ROM'S MOUNTED SKELETON of the sabre-toothed cat *Smilodon fatalis* is a favourite with many school-age visitors. Retrieved from the tar pits of California, the cat is just one in the ROM's collection of *Smilodon* fossils, considered to be among the world's finest. Mostly from Peru, as is the example shown above, all 1729 fossils were collected from tar-pit deposits in 1958 by now-retired ROM curator Gordon Edmund. While most people are familiar with the sabre-cat—not least because of *The Flintstones*—many may be unaware that the suite of features defining a sabre-toothed animal has evolved at least four separate times in different mammals: in a lineage of marsupials, in two extinct lineages of carnivores called creodonts and nimravids, and of course in the cat family. That these unrelated lineages separately evolved similar features is called biological convergence, and suggests that such features must be a good way of killing prey. For the past 40 million years, until *Smilodon fatalis* went extinct about 10,000 years ago, at least one sabre-toothed animal existed on Earth. How this cat would have used its large teeth in feeding has attracted much attention. Without a living sabre-toothed animal to study, the feeding method is difficult to reconstruct. Paleontologists believe that the sabre was a slashing, not a stabbing, mechanism. A slash to the throat, cutting the windpipe and major arteries, would be the quickest way to kill prey. Not very pretty, but it got the job done.

—Kevin Seymour

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LETTERS

Extinction Analysis

ON READING the article "Eve of Extinction" in the current issue (Summer/Fall 2001) I found it gee-whiz in its style and presentation, and inconsistent in development of its path towards certain doom. There are some good writers among your curators, but the author of this piece was in fact a professional popularizer and in my opinion the article is below the standard that I expect from a ROM publication.

J. E. REHDER
TORONTO, ONTARIO

REGARDING "Eve of Extinction" by William Glenn in the Summer/Fall 2001 issue of *Rotunda*, I was very impressed. Your informative, provocative and, most of all, timely article on the imminent man-made danger of extinction has stirred me to action.

The biodiversity of planet Earth, of which we know so little, is poised on the brink of extinction. Regardless of whether our pride (insert arrogance) is prepared to admit it, the human species is but one of hundreds of thousands of plants, animals, and other species that may perish. I was particularly distressed to learn that many of the species that are on the verge of extinction are presently unidentified to science.

The encouraging words of Dr. Hans-Dieter Sues at the end of the article calling for men and women of science to become strong advocates for the preservation of Earth's biodiversity is very refreshing and promising. This is just the kind of knowledgeable scientist that can not only inform the public and the politicians but can help to avert the oncoming tragedy. The essential question each of us must answer personally is "What kind of environmental legacy are we going to leave for our children and our children's children?"

Excellent work.

ROB EVANS
WILLOWDALE, ONTARIO

Squashed Controversy

WITH REFERENCE to the article "43rd Parallels" in your Winter 2000 issue, I would be interested to know what kind of squash was grown in prehistoric Japan?

It has always been my understanding that winter squash (*Cucurbita maxima*) is a native of the New World and was unknown outside the Americas before European colonization. All references that I've consulted indicate that it is a native American species. Even the name "squash" is derived from an Indian word meaning "green" or "raw."

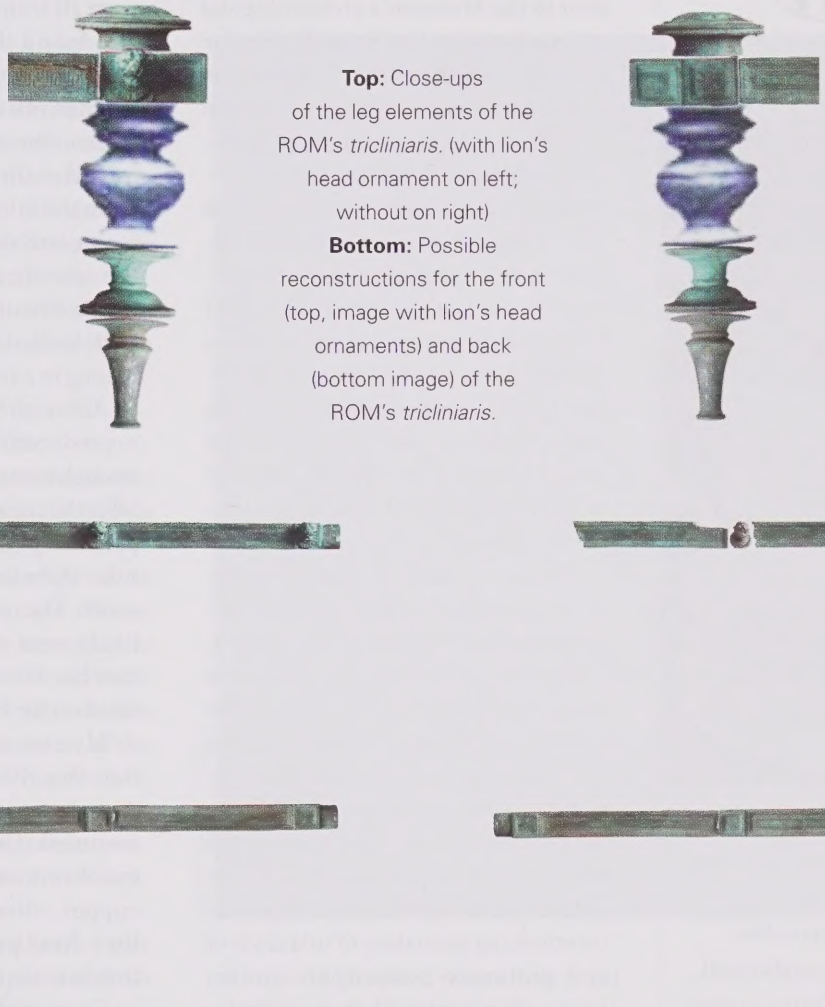
R. S. CRAGGS
WEST HILL, ONTARIO

Gary Crawford replies: It's nice to see that people read so carefully. I have published on squash in the eastern North American archaeological record and you are quite correct. In the *Rotunda* article, though, I am referring not to prehistoric crops in Japan but to those grown by the ethnohistorically documented Ainu. The squash grown in 17th- to 19th-century Hokkaido most likely would have been *Cucurbita pepo*. Certainly by the 17th century, New World crops, including tobacco, had made it to Japan. I have even found maize at one site in Hokkaido, carbon-dated to the 17th century.

WRITE TO: *ROTUNDA*, 100 QUEEN'S PARK, TORONTO, ONTARIO M5S 2C6.
THE EDITORS RESERVE THE RIGHT TO EDIT FOR LENGTH AND CLARITY

Reclaiming a Roman Recliner

With a trolley-full of disparate components from an ancient Roman dining couch, the Conservation Department searched to discover its likeliest original form.



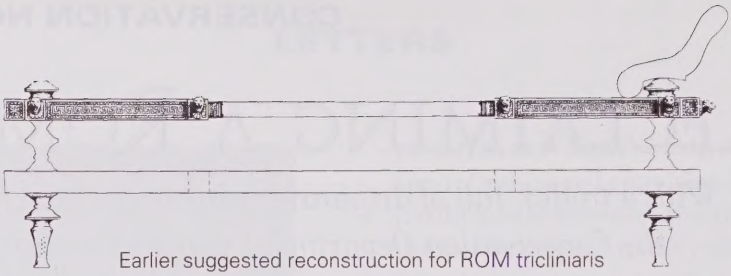
Top: Close-ups of the leg elements of the ROM's *tricliniaris*. (with lion's head ornament on left; without on right)
Bottom: Possible reconstructions for the front (top, image with lion's head ornaments) and back (bottom image) of the ROM's *tricliniaris*.

ARRON LOWE / 958.243A-Z AND AA

In the lives of ancient Greeks and Romans, lively banqueting played an important role, as the recent ROM exhibition *Gift of the Gods* demonstrated. At the heart of this revelry was the wine itself, as it often is today. But there are many other, often overlooked, elements of the banqueting scene. One accoutrement, the dining couch, was a simple piece of furniture essential to the comfort and mood of the diners.

These couches, called *lectus tricliniaris*, often were arranged in threes around a central table in a *triclinium*, or dining room. Each accommodated a single diner reclining on an elbow. In 1958, the ROM acquired 27 components of a Roman dining couch, not enough to assemble a complete couch. The parts reputedly were from the site of Monte Leone near Spoleto, Italy. This type of information often offers clues about such an artifact's date and who it might have been made for, but unfortunately, because the pieces were not recovered from a formal archaeological excavation, their provenance cannot be confirmed.

Recently, the components were



Earlier suggested reconstruction for ROM tricliniaris

sent to the Museum's archaeological metals conservator, Susan Stock, for possible reconstruction. The plan was to assemble the couch for inclusion in the *Gift of the Gods* exhibit. It soon became apparent, however, that reconstruction would be no simple feat and that substantial research was required. Fortunately, that's when I arrived at the museum as a volunteer. I had recently completed my Master's degree in Ancient Studies at the University of Toronto and was given the opportunity to lend myself to the Conservation Department. My first assignment at the ROM was substantiating all aspects of this couch.

Almost at once, as I began the research, I discovered that very few complete couches have ever been found. Complicating the issue, more than one motif decorated the components of the ROM couch. Certain elements have a cast vegetal motif—called a Lesbian kymation—framing the outer face. Some of these same pieces also have inlaid rectangles of copper and silver. Other pieces feature a different design with interlocking meanders of inlaid silver and protomes—zoomorphic fantasy beasts often used as a foot or other element in furniture—in the form of panther heads. The panther is among the beasts associated with Bacchus, the god of wine—a suitable decoration for a banqueting scene.

The dual motifs led to much contemplation and frustration. I began to wonder whether the 27 elements really represented a single piece of furniture. From the literature, I was able to find that furniture makers in ancient Rome did not shy away from mixing motifs on one couch. So it was possible these differently decorated pieces were all from the same couch.

I found the final clue among the couch's corner brackets. Two of them bear the inlaid double-rectangle motif seen on the one group of components as well as the attached panther heads from the other group. A third bracket is similarly decorated, though without the panther head. These corner brackets with both decorative motifs indicate that all the ROM components belong to a single dining couch.

Although there are not enough parts to produce a complete couch, there are enough to suggest the original form. I offer the reconstructions shown on the previous page as plausible representations of the front and back of the dining couch. The rails with the panther heads likely went on the front, as ancient couches were often more heavily decorated on the front than the back.

My research also demonstrated that the ROM's artifact is perhaps more important than was previously assumed. Only the most expensive couches were decorated with inlaid copper, silver, and glass. The panther-head protomes and cast corner brackets also appear to be unique.

Conservator Susan Stock has now taken samples of the metals and these, along with other, more detailed, analytical research, will be published in the proceedings of the 15th International Congress of Ancient Bronzes.

Arron Lowe holds a Master of Arts in Fine Art History, Ancient Studies Collaborative Program, University of Toronto. Currently he is attending a conference in Greece, where colleague J. W. Shaw will be presenting a paper co-authored with Arron, about an architectural element of the Minoan palace of Knossos.

Alien Invaders in the News

ROM entomologists reflect on the biggest "bug" stories of the summer: aphids, West Nile Virus, and lady beetles.

CHRIS DARLING AND DOUG CURRIE

Invasive species are organisms that are non-native to a particular ecosystem, and whose introduction harms or has the potential to harm human health, the environment, or the economy. Three such invaders made headlines in southern Ontario during the summer of 2001—the soybean aphid, the West Nile virus, and the multicoloured Asian lady beetle.

Days of the Aphids

When it comes to the news, what is not said can be as important as what is said. In early August the Toronto media was abuzz with coverage of an aphid invasion. Front-page stories ran in two leading daily newspapers and there was extensive TV and radio coverage. But in none of these stories was there mention of the name of the species that was disturbing the languid dog days of summer—the species that had the audacity to cause suspension of a Bluejays game at the SkyDome, no less.

Days later I suggested, with some trepidation, that the culprit was *Aphis glycines*, the soybean aphid. As the key that unlocks all that is known about any given species, the scientific name—the result of a correct identification—is critical. Determining which aphid was invading the city was easier than expected, clearly illustrating the pace at which information is transmitted in today's world. Through a lot of serendipity—most importantly a hunch that Toronto's problem might be linked to pest problems in soybean fields to the west—the Internet, and the assistance of experts in aphid identification, I confirmed that Toronto's "tiny green bugs" were indeed *Aphis glycines*, the soybean aphid.

Identification of the aphid put the invasion into perspective: Torontonians were merely being annoyed by the hordes of tiny winged creatures, while in agricultural lands west of the city soy farmers were dealing for the first time with an introduced pest that had the potential to destroy a crop worth more than $500 million a year.

Knowing which aphid we were dealing with also helped to make sense of an otherwise bewildering event. Questions such as "Where did the aphids come from?" "Are they going to damage trees and gardens in the city?" "Why have we never seen anything like this before?" "When will they go away?" and "Will they return?" could now be answered with a high degree of certainty.

TRACEY BAUTE, OMAFRA

Scads of soybean aphids feeding on soybean plants west of Toronto.

Native to China, the soybean aphid feeds primarily on its namesake, *Glycine max*—soybeans. This aphid is a pest throughout much of Asia and was recently discovered in Australia. In 1999 it was first reported as a pest in North America, though it probably was introduced a few years earlier. We still don't know the aphid's route of entry. It has been a pest in the US Midwest for the last two years, causing major concern in Wisconsin, Illinois, and Michigan. This was the first year the species was reported in Ontario.

Like many aphids, *Aphis glycines* has a complex life cycle and to complete it—and to become established in an area—the aphid requires two hosts. Unfortunately for Ontario's soybean farmers, the aphid's alternate host, the buckthorn shrub (*Rhamnus*), also grows in the province. Aphids have two forms, wingless and winged, allowing them to move between the two hosts. In the fall, aphids lay their eggs on buckthorn, where the eggs overwinter. In the spring, wingless aphids hatch and spend several weeks feeding on buckthorn before laying their own eggs, which produce a generation of winged aphids. These disperse to soybean fields.

Once there, the aphids feed on soybean leaves and produce generation after generation of wingless aphids, all the while sapping the vigour of the plants. As the nutritional quality of the soybean plants declines in late summer, winged aphids are again produced, this time in vast numbers. Weak fliers, aphids are at the mercy of the air currents as they disperse in search of the overwintering host, buckthorn, where they mate and lay eggs to repeat the cycle. This explains the sudden influx of aphids in Toronto in early August: Toronto's aphids were the winged dispersers from the soybean fields in southwestern Ontario.

Knowing this, we knew that these aphids would not damage gardens and ornamental or shade trees in the city; soybeans are rarely planted and buckthorn is not a major horticultural concern. The vast majority of these aphids were doomed—and our annoyance with them was short-lived.

On the down side, we can be fairly certain that the soybean aphids will be back. As long as soybeans are grown in southwestern Ontario, Toronto is well within the dispersal range of the winged aphids. The numbers that descend on the city in future will be determined by aphid populations and prevailing winds. But keep in mind that the disruption of a few summer evenings pales in comparison to the serious losses—estimated at between $125 million and $150 million—experienced by the farming communities of southwestern Ontario. This news item, initially pitched as another annoying insect story, demonstrates the serious problems that can result from the globalization of insects and other organisms.

By Chris Darling

Putting West Nile Virus in Perspective

In the last issue of *Rotunda* I wrote an article ("Mmmmmmosquitoes") that made passing reference to the occurrence of West Nile Virus in the northeastern United States. With the subsequent discovery of the virus in southern Ontario (along with unprecedented media coverage), it's a good time to reflect back on the most significant "bug" story of 2001.

The first reports of West Nile Virus (WNV) in North America came in 1999 from New York City and environs. By October 2001, the range for this virus extended from southern Ontario to northern Florida, and from the eastern seaboard to Missouri. First discovered in the West Nile district of Uganda in 1937, the virus has now been found in Africa, Europe, the Middle East, west and central Asia, and Oceania, as well as North America. It's not certain how the virus got here, but it is believed to have arrived by plane, either on its own or carried by a human or a bird.

The virus is transmitted from mosquitoes primarily to wild and do-

mestic birds; however, humans and other mammals may contract the disease if bitten by infective mosquitoes. Fortunately, the main carrier of WNV, the mosquito *Culex pipiens*, is a reluctant biter of humans.

Although the virus can cause encephalitis or inflammation of the brain, symptoms typically are much milder. In fact, most people who become infected either show no reaction to the virus or become only mildly ill. Some symptoms are fever, headache, body aches, and occasionally skin rash and swollen lymph glands. While WNV can be fatal, only the elderly and those with immune deficiencies are vulnerable. Only 10 North Americans from the highly populated areas in which the virus is known to occur have succumbed to the disease.

The presence of WNV in Canada was confirmed in late August 2001 from a bird carcass discovered near Windsor. This was the first mosquito-borne disease reported in Ontario since St. Louis encephalitis was detected in the province in the 1970s. To date, 101 birds have been confirmed positive for WNV, but neither the virus nor its symptoms have so far been detected in humans. Bird mortality continues to be the most sensitive method for tracking WNV activity, with crows and blue jays being particularly susceptible in Ontario. The virus is now confirmed to occur in a broad swath of southern Ontario, from Essex County in the west to York County in the east. It seems likely that the virus will eventually spread to other regions inhabited by its mosquito carriers.

While the spread of an exotic disease is alarming to many people, it is important to keep the threat in perspective. Only 10 deaths in North America have been attributed to WNV since its discovery in 1999. Given the enormous human population over the range of the virus, it would seem that the actual threat is miniscule relative to everyday phenomena such as the common flu and traffic mishaps. (This coming winter, about 26,000 North Americans are expected to die of the flu.) Ontarians can go a long way towards protecting themselves by reducing mosquito habitat in their own backyards and by taking simple measures to protect themselves from mosquito bites. (Advice was provided in the Summer/Fall edition of *Rotunda*.) The prognosis for the 2002 mosquito season? You are more likely to come to grief travelling to the cottage than falling victim to West Nile Virus.

By Doug Currie

Ladybird, Ladybird Fly Away Home . . . Please

As far as insects go, lady beetles enjoy a superb reputation; they are one of the few groups of insects that most people actually like. Often referred to as ladybugs or ladybird beetles, lady beetles are immediately recognizable. Brightly coloured and usually spotted, they feature prominently in children's books and are a common inspiration for toys and fridge magnets. Generally, they are considered beneficial; these beetles consume prodigious numbers of many pest insects. Adults of the convergent lady beetle, *Hippodamia convergens*, which can be purchased at many garden centres in the spring, for example, can eat almost 60 aphids per day!

It was disconcerting, then, to receive calls from the public and the media in early October about hordes of lady beetles annoying people throughout Ontario. Not only were the beetles entering houses in large numbers but they were also biting — very unladylike behaviour!

SCOTT BAUER, COURTESY OF THE U.S. AGRICULTURAL RESEARCH SERVICE

Convergent lady beetles, available at many garden centres in spring, can eat almost 60 aphids a day.

Who are these rogue lady beetles and why were they here in such large numbers? The answer to the first question is easy — the vast majority of lady beetles

in Toronto and environs are *Harmonia axyridis*, the multicoloured Asian lady beetle. They're here because they were deliberately imported into North America to do what lady beetles do best: eat aphids. This is just the latest in a long history of lady beetle introduc-

CHRIS DARLING, ROM

The multicoloured Asian lady beetle, ranging in colour from black to mustard with zero to many spots, was the species that invaded Toronto in vast numbers this fall.

tions, both deliberate and accidental.

More than 80 species of lady beetle have been reported in Ontario. The easiest way to get an appreciation for their diversity of form and colour is to check out the University of Guelph's Web site at www.uoguelph.ca/~samarsha/lady-beetles.htm. Many of these species were introduced from Europe and Asia and, significantly, these aliens are now the most abundant species of lady beetle in the province. Introduced species are a mixed blessing. They are important allies to farmers in their ongoing efforts to control the damage caused by many potentially devastating aphids without having to resort to expensive and environmentally dangerous insecticides. But the result—aside from a lot of dead aphids—has been a decline in diversity of Ontario's native lady beetles.

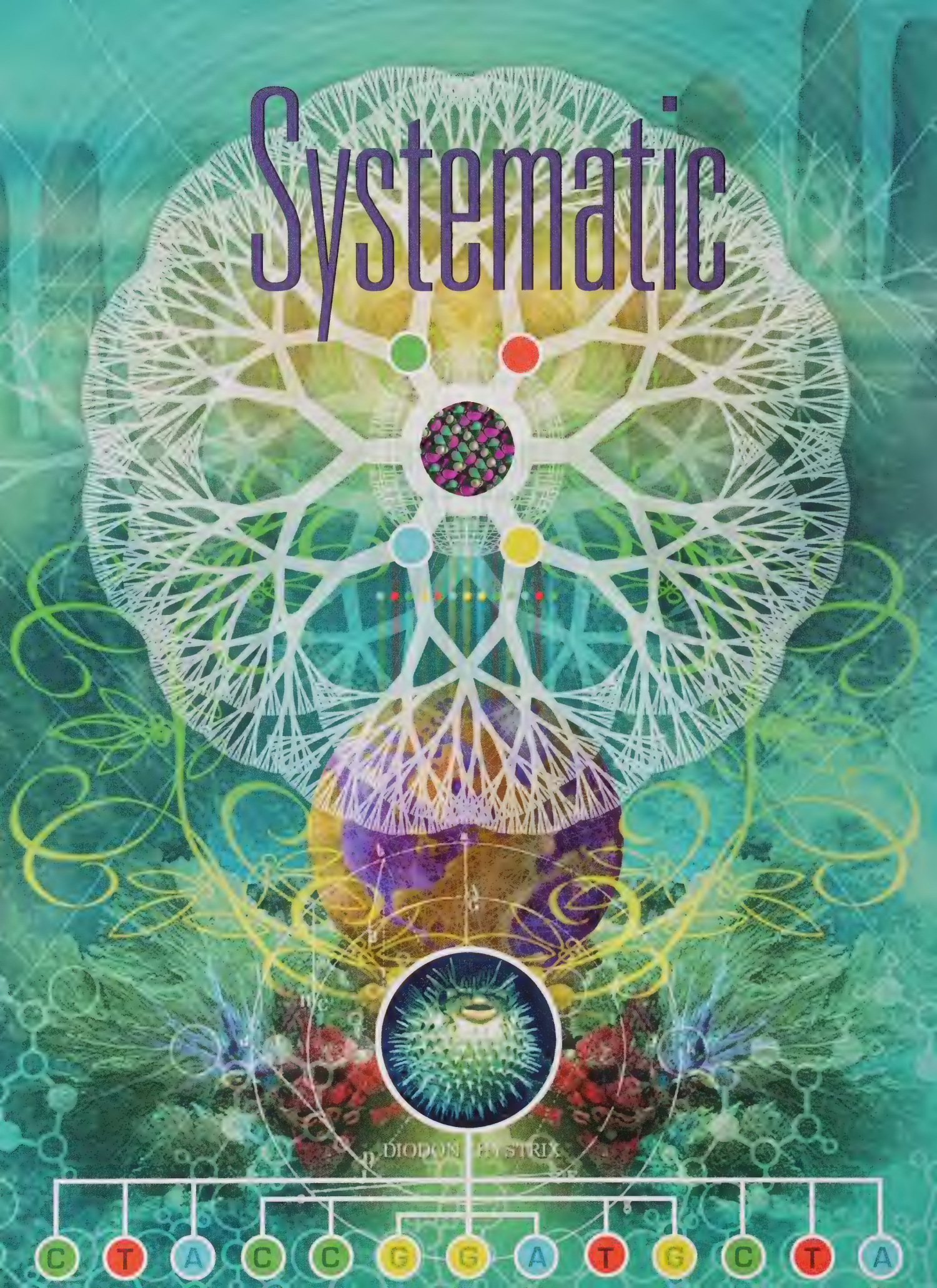
Insect collections, like those maintained by the ROM, clearly show the impact of these aliens. Two native species, *Coccinella novemnotata* and *C.*

transversoguttata, have not been recorded in Ontario since 1987. Both were common before 1980 when the European species *C. septempunctata* or C-7 became established in Ontario. In the 1990s, C-7 was the most abundant lady beetle in Ontario. But, at least in some areas such as Toronto, C-7 has had to relinquish this dubious distinction to the more recent invader, *Harmonia axyridis*. This species showed up in Ontario for the first time in 1994 and is now extremely common throughout the southern part of the province. It was this lady beetle that caused the recent public concern in southern Ontario.

The extremely high numbers of lady beetles in Toronto this year were almost certainly a direct result of the explosion of the introduced soybean aphid population in southwestern Ontario. The aphid outbreak provided limitless food for lady beetles. In the fall, as the adult beetles dispersed from the soybean fields in search of overwintering sites, many of them ended up in Toronto. The throngs of beetles we saw were trying to find sheltered areas in which to aggregate and pass the winter. Reports of these beetles biting—although infrequent and not worrisome from a public health perspective—and damaging grapes, peaches, and tomatoes are new behaviours for lady beetles. This may have been a result of rapid depletion of food resources at the soybean fields just before the lady beetles departed.

This is not the last we will hear of the multicoloured Asian lady beetle. As temperatures warm in the spring, the overwintering adults will become active and will disperse from their overwintering sites—and many will again end up in people's homes. Should you find yourself sharing quarters with lady beetles, simply sweep them up. What you then do with them will depend on whether you view these introduced lady beetles as allies in keeping pest numbers manageable or as a serious threat to Ontario's unique and native biodiversity.

By Chris Darling


Systematic
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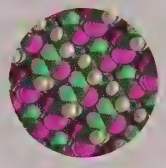


A little-known and undervalued branch of biology is about to be heralded as keeper of the key to major scientific breakthroughs

By Francesco Santini and Sara T. Scharf

LOOK AT ANY COLLECTION of Gary Larson's *The Far Side* cartoons and you're sure to see odd-ball entomologists, herpetologists, or ichthyologists creeping people out as they play with their bugs, lizards, or fish. Larson's perspective isn't all that unusual. The media, when it portrays these systematic biologists at all, often takes a "mad collector" slant. Even other scientists consider them mere "stamp collectors" who spend time in exotic locations obsessively trapping large numbers of snails or butterflies. Truth told, many people have no idea what systematists really do.

What they do is this: collect specimens and study them in detail to discover the common features that group related organisms together. It's the process of constructing family trees, or phylogenies. To understand the significance of these trees, consider that Charles Darwin, father of the modern evolutionary theory that unifies all biology, used such a tree as the sole illustration in his revolutionary book, *The Origin of Species.*

Today, it looks like this little-known branch of biology—systematics—could well be the key to advancing our understanding of how organisms develop from their genes and evolve into new life forms. Already phylogenies are widely used in a variety of fields: tracking the develop-

Illustration by Paul Watson / Three in a Box

ment and spread of diseases such as AIDS, discovering new sources of medicinal compounds, and finding new ways to reduce crop damage from insect and fungal pests, to name just a few. Now, systematists are starting to use the patterns of relationships they discover among organisms to help other evolutionary biologists infer which processes have played roles in the evolution of all life. In one such collaborative project, ROM systematist and University of Toronto graduate student Francesco Santini has teamed up with genome scientists and developmental biologists at various American and European universities (See "Fishing for Evolutionary Answers," below).

Despite such groundbreaking work, systematics remains one of the most misunderstood areas of biology. Over the past 50 years, as other branches such as molecular science and genetics have come to the forefront of biological research, systematics has become increasingly marginalized. Worldwide, resources for systematic research have declined to such an extent that professional systematists, like many of their study subjects, are at risk of becoming an endangered species. There are only 3000 to 6000 systematic scientists in the world, their average age now 55, whereas geneticists number in the tens of thousands, with large numbers of young students entering the field. (Natural history museums, such as the ROM, are the precious few places where it is still possible to find significant numbers of researchers focusing on our planet's biodiversity.)

A couple of reasons might explain this decline. The first is that systematics just isn't sexy. Most systematic research is still done the old-fashioned way—with ordinary microscopes, species identification guides, and a great deal of attention to detail. Its methods attract far less attention than multi-million-dollar particle accelerators or high-tech gene sequencers. But there's a second and perhaps more critical reason for the low profile of whole-organism-based systematics. That reason is the exalted status that science has accorded—at least since the late 17th century—to reductionist approaches to the natural world.

For some 300 years reductionism has been the trend. Since the days of Descartes, who was convinced that he could discover God's intention by deconstructing the natural world, science has proceeded largely by breaking complex systems down into their basic components, then attempting to explain the whole in terms of simple interactions of the parts. In biology, the reductionist trend is strongest in genetics: a gene is one of the smallest functional parts of an organism, a fragment of DNA that holds the recipe for producing a protein.

With systematics, researchers have traditionally studied whole organisms rather than isolated parts. Still, each time

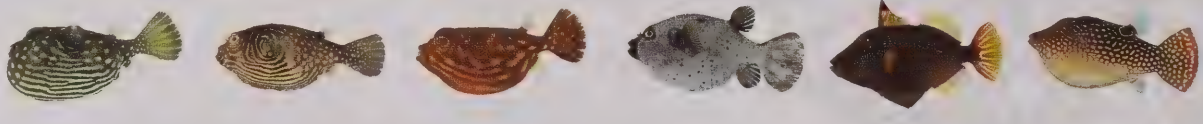
Fishing for Evolutionary Answers

In an effort to understand the mechanisms of evolution, systematists from the ROM and the National Museum of Natural History of the Smithsonian Institution in Washington, DC, and genome scientists and developmental biologists in various American and European universities are conducting one of the first collaborative studies between systematists and geneticists. They are studying a lineage of organisms particularly attractive as a model group—an order of bony fish called the Tetraodontiformes. The group includes triggerfish, boxfish, and pufferfish, as well as the gigantic "tailless" ocean sunfish. What makes the Tetraodontiformes attractive as a model group is its monophyly (all the fish in it share a common ancestor), its high degree of variability in body structures, and its small size—approximately 340 described species.

Since the time of Aristotle and Pliny the Elder, the diverse and unusual body forms of the fish in the group have attracted the interest of students of vertebrate anatomy and natural history. While the most primitive or basal Tetraodontiformes differ only slightly from the typical body structure of other perch-like fish, in the skeletons of the more derived (more recent and modified from the ancient species) Tetraodontiformes, many bones have become fused with others, rearranged, expanded or simplified, extremely reduced in size, or even lost altogether.

Since the 1970s, Dr. Richard Winterbottom, now curator at the ROM, has studied the musculature of the Tetraodontiformes to produce the first modern phylogenetic analysis—family tree—of the group. His conclusions were recently corroborated by an exhaustive two-year study by Francesco Santini, a PhD candidate in zoology at the University of Toronto and the ROM's Centre for Biodiversity and Conservation Biology, and Dr. James Tyler, senior scientist at the Natural History Museum in Washington, DC. This knowledge gives the researchers confidence that, by using the available phylogenies as a reference, they can identify which are primitive and which are the derived states of many of the fishes' features—data essential to understanding the group's evolution and consequently how these fishes' genes affect their morphology.

A set of exceptional fossils found in Monte Bolca near Verona in northern Italy (and now housed in vari-



COLLECTED AND PHOTOGRAPHED BY RICK WINTERBOTTOM

genome scientists and molecular biologists need to establish how the organisms whose genes they study fit into the tree of life, they must concede the practical use of systematics. Without systematic biology, many discoveries of how genes work would be without the context that provides a larger meaning.

Even so, on the strength of the reductionist tradition, many biologists have long been convinced that the functions of organisms could be entirely explained by understanding the structure of their genes. In 1990, when the Human Genome Project was launched—a well-advertised enterprise in which private and government-funded groups of scientists aimed to fully sequence the DNA in the human genome—it commanded the lion's share of public attention. Many people claimed that mapping the entire set of genes—or genome—in the human body would reveal everything we would need to know about how human beings work and how we develop from our genes.

The hypothesis was that each gene produced one protein—an organic compound composed of amino acids, essentially the body's building blocks. The number of genes an organism had, then, was thought to indicate the complexity of its structure. When in the early 1990s the fruit fly *Drosophila melanogaster* was found to possess only 13,000 to 14,000 genes and the roundworm *Chaenorhabditis elegans* to have just over 19,000, researchers estimated that humans would have well over 100,000 genes.

But things have not turned out to be quite so simple. Now that the Human Genome Project is complete, it has revealed that *Homo sapiens* possesses only 30,000 to 40,000 genes. In other words, our complex human bodies develop under the directing influence of just twice as many genes as roundworms. And early data from the study of a species of pufferfish are indicating that some of these fish may have as many as 50,000 genes. These findings augur major problems with the one-gene, one-protein view of life. And we are still far from understanding the details of the relationships between organisms' genetic codes or DNA—their genotypes—and the living organism that is produced from it—their phenotypes. As it turns out, there is more to the story of genetics and evolution than gene sequences alone can explain.

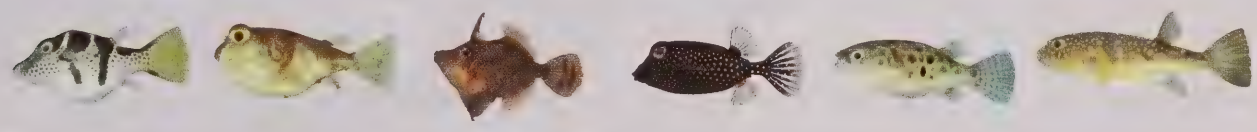
During the last two decades no field of biology has made greater progress than molecular biology, the study of DNA. Molecular techniques are now widely employed in the production of new drugs, paternity tests, identification of criminals, tracking genetic diversity, and even in cloning. But all this progress has not given us all the answers and thereby eliminated the need for experimental research in biology as some molecular biologists predicted it would. It has led, instead, to new beginnings.

ous museums worldwide) allows the researchers to determine when many of the skeletal features of Tetraodontiformes originated. The fossils show that all of the modern lineages of tetraodontiform fish were already present during the middle Eocene, 50 million years ago. In some cases, the similarity between the Eocene forms and the modern forms is striking, indicating that a rapid diversification of these fish occurred probably shortly after the mass extinctions at the end of the Cretaceous period. During the long period between then and now, the skeletons of the Tetraodontiformes have remained virtually unchanged.

The phylogeny, or family tree, developed by Winterbottom, Santini, and Tyler tells us how many times the various body structures have been either simplified or lost. Combining this data with molecular techniques enables the researchers to take a new, experimental approach to studying the origin and evolution of these fishes' structures.

Soon the researchers will attempt to map the number and structure of Hox gene clusters (genes key to regulating body development) onto the family tree of this well-known group of fish. This will tell them how well the skeletal phenotypes match the regulatory genes thought to control the bones' development. The study will be the first to examine these evolutionary patterns in such detail—detail that would be impossible to obtain without the knowledge of these fishes' family relationships generated by extensive systematic research.

Once the first stage of research is complete, the hypotheses can be tested using knock-out mutations that disable specific genes. If, for example, two related species of fish differ in only one feature—one species showing the primitive form and the other a derived form—it may be possible to manipulate the gene or genes involved in the production of this structure to reproduce one form of fish from the other. This experimental approach should provide clear answers to questions about the relationships between genotype—an organism's genetic code or DNA—and phenotype—the animal that develops from it—and should allow scientists to observe how morphological structures change with changes in the genome.



In the late 1980s, when the highly theoretical field of population genetics still dominated evolutionary biology, developmental biologists—who study how organisms develop from embryo to adult—began to realize that they were unable to explain some of their findings in the context of population genetics. So, quietly, they began to unite with systematists and palaeontologists, with the common goal of better understanding the mechanisms that control development in living forms. As molecular science progressed by experimenting with DNA, this group was experimenting in other ways to figure out how phenotypes develop and how new species originate. A major finding of this new field of research, called evolutionary developmental biology, has been that nature often uses the same fundamental machinery to create vastly different creatures. Key regulators in early development— the genes controlling formation of many internal organs, for example—are the same in worms as they are in vertebrates like us. Since these genes tell early cells what to become—gut or muscle cells for example—it may be possible to learn about the causes of many human developmental defects by examining how worms or flies develop.

The Human Genome Project has shown that many genes not only produce more than one protein, but have multiple functions. Some genes even control the behaviour of other ones. Called regulators, the controlling genes are more important than others in producing a living creature from its molecular set of instructions. These interactions between genes, rather than being additive in a linear way, form webs of influence, which in turn produce structures and functions. We still do not have a clear picture of exactly how this works. The fight against cancer—a complex of diseases in which gene regulation goes wrong—demonstrates how much more difficult it is for biomedical research to solve these problems than was previously suspected.

Studies indicate that evolution in organisms' important regulatory genes paves the way for innovations, such as novel body forms, to emerge. One of the main groups of regulatory genes identified so far is the Hox family—a set of genes that perform fundamental roles in regulating development of animals' bodies, including producing the skeleton in vertebrates. All animals have Hox genes, and it seems that the more Hox genes an organism has, the more complex its body structure is.

The problem with both developmental biologists' and geneticists' hypotheses about Hox genes is that the vast majority are based on studies using a limited number of "model" organisms—fruit fly, roundworm, zebrafish, frog, and domestic mouse. While this research has led to a good understanding of how the genetic system functions in these particular organisms, using only model species is limiting and may even lead to false assumptions. This is where the expertise of systematists is needed.

Typically, animals are selected as models because they are easy to work with: they are simple to obtain and keep in laboratory conditions, or they have transparent larvae with easy-to-see skeletons, or their genomes are relatively simple. Little attention is paid to their relationships to other animals. With no family tree for context, it is impossible to say which properties of a model organism are inherited from distant ancestors and which are unique to the individual species—information that is essential to understanding how genotype and phenotype have co-evolved.

Another problem is that a model organism may represent only a fraction of the diversity of the phylogenetic group to which it belongs—fruit flies, for instance, are hardly representative of arthropods in general. They can give us only a very incomplete view of the diversity of biological mechanisms. And because model organisms are chosen for their utility as lab animals, they all tend to possess certain features that often are not present in other species of their groups. Most model organisms, for example, exhibit short generation times and very rapid development, and are among the smallest species of their group. This makes sense from an economic viewpoint: small animals occupy less lab space, and rapidly developing organisms allow researchers to get results more quickly.

Yet, these same features that make model organisms attractive to researchers all lead to either simplification of or complete lack of various body structures, making the animals atypical rather than the norm. And because the features of lab animals may have all been created by similar genetic mechanisms and may have given origin to similar morphological structures, biologists might wrongly assume that these mechanisms have played a dominant role in the history of life and

Glossary of terms

DNA (dioxyribonucleic acid)—the genetic material found in the cells of living organisms, inherited from one's parents.

Gene—a segment of DNA that produces one or more polypeptides (chains of amino acids). Large polypeptides are called proteins.

Protein—a fundamental constituent of living cells; different proteins act as such things as enzymes, structural elements, hormones, and antibodies.

Genome—the total genetic information of a living organism. All the DNA in a cell.

Genotype—the genetic constitution of an organism, as opposed to its physical embodiment (the phenotype).

Phenotype—the physical manifestation of an organism; the properties produced by the genotype in conjunction with the environment.

that these structures are common. By focusing on too few animals we may greatly underestimate the number of different body structures and evolutionary mechanisms that create them—even misunderstand our own evolution.

Systematics offers biology another piece of the puzzle. In systematics, the fossil record is crucial in determining the origin and evolution of organisms. Yet, in genomics and developmental biology studies, the fossil record is rarely taken into consideration, and this can lead to distortions. Take the sea lamprey, for instance. In genomics, it is considered a model organism for studying the evolution of the vertebrate genome because the lamprey's lineage is the sister group to that of all the other vertebrates—the two share a common ancestor. By choosing the sea lamprey, however, genome scientists overlook extensive changes that have occurred in the 400 million years since it diverged from that common ancestor.

Modern lampreys grow to almost a metre in length, are covered in slimy scaleless skin, and use their rasping tongues to wound fish on whose blood they feed. Their ancestors, on the other hand, were covered in large plates of armour, filtered seawater for small prey, and reached lengths of a few centimetres at best. Studies that treat lampreys then and now as roughly equivalent are clearly flawed.

Studying model organisms within the context of a larger study of model groups would help eliminate some of these problems. Ideally, biologists should choose groups with robust phylogenies—fully studied family trees supported by data from the whole spectrum of structural variability within the group, including fossils. Although financial concerns can obviously limit which groups are chosen, some are already well enough known to meet all the requirements. Since systematists produce and organize this knowledge, they are ideal partners for the new genomic studies.

The results of recent genomics studies have certainly dealt a blow to the way in which, for decades, we have viewed the relationship between genotype—DNA—and phenotype—the living creature produced from the DNA. Our best chance to reach a thorough understanding of how organisms work, evolve, and diversify is through greater collaboration among scientific disciplines. The hope is that pioneering works like the ROM's current joint project will help to set the stage for a new era of cooperative study and replace the past mania for reductionist assumptions with a more appropriate, holistic view of biological complexity.

After all, systematics has had since before the days of Darwin a profound impact on modern science. It is still used in preserving biodiversity and determining Earth's ancient geography, and will perhaps even be useful in the very unravelling of human origins. The systematists whose role in biology was for a time belittled are now sorely needed. Perhaps the underdog of biological sciences will soon mature into one of the most highly regarded areas of research. •

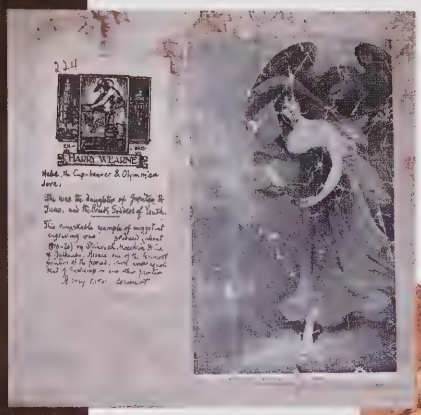
Pufferfish and "Junk" DNA

Smooth pufferfish possess the smallest known genome of all vertebrates, between 0.8 and 1 picogram (a picogram is a billionth of milligram) of DNA per nucleus—equivalent to about 400 to 500 million base pairs, the sequence of bases strung in pairs that make up the DNA molecule. For comparison, the human genome contains approximately 3 billion base pairs, and there are more than 7 picograms of DNA in each human cell.

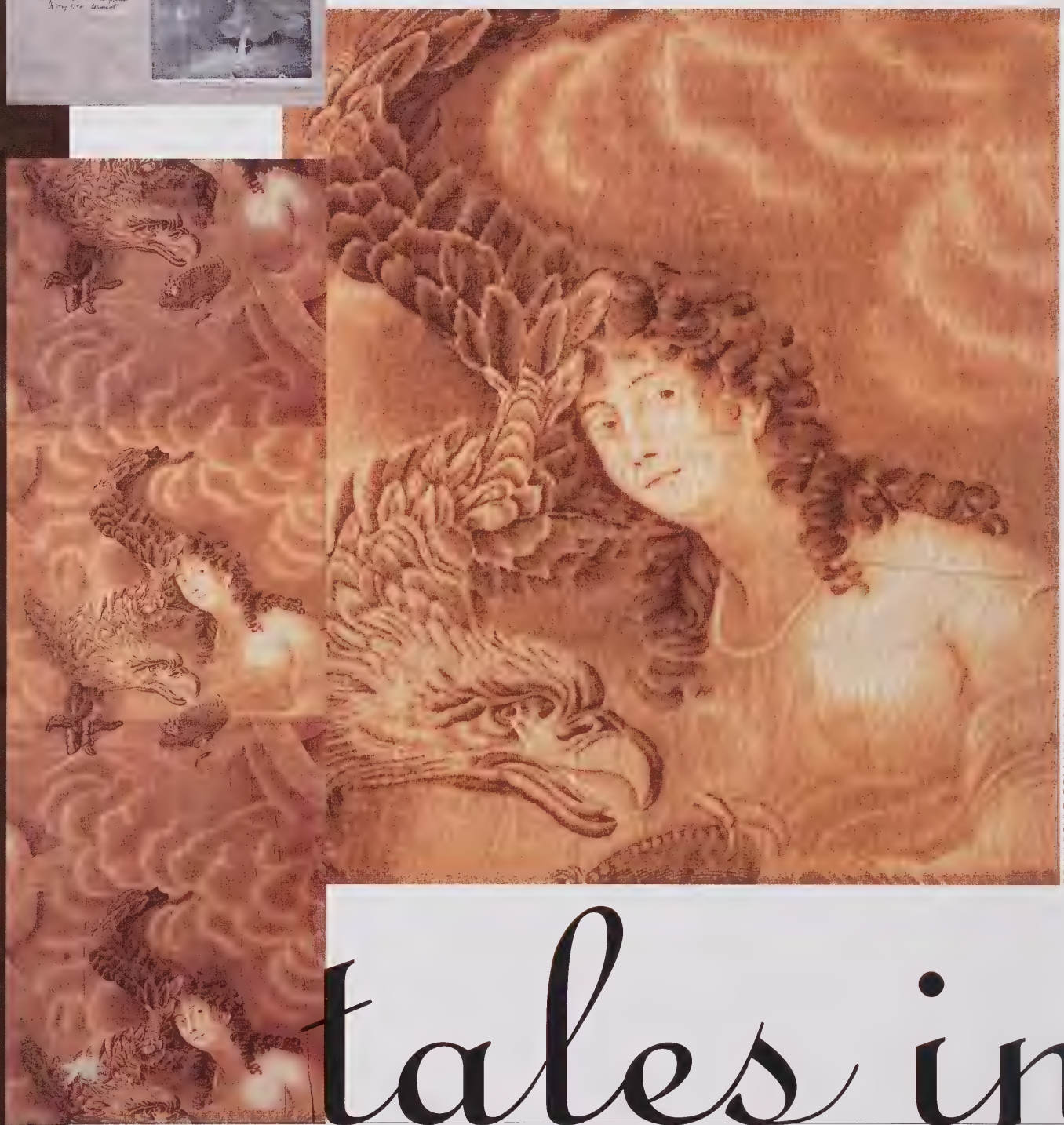
Despite its small quantity of DNA per nucleus, the pufferfish *Fugu rubripes*—better known as the sushi fish that can be fatally poisonous—contains approximately the same quantity of, if not more, coding DNA and genes as humans. At first glance, this seems impossible. Yet, in most other eukaryotes—organisms whose cells each possess a nucleus, such as fungi, plants, and animals, as opposed to bacteria—between 20 and 95 percent of the DNA is composed of so-called "junk" sequences repeated sometimes thousands of times. These sequences, unlike genes, are not used in synthesizing the proteins that contribute to an organism's development and maintenance. They may even be of ancient bacterial or viral origin.

Pufferfish seem to lack most of these repeated sequences—which comprise only 10 percent of *Fugu* DNA. After this was discovered in 1968, scientists suggested there may be a causal connection between the fish's reduced genome size and its very simplified body structure. They also hypothesized that the massive ocean sunfishes, which have the most modified and reduced skeleton of all the Tetraodontiformes—the group to which *Fugu* belongs—should have the smallest genome size, in other words, the least DNA. Recently, it has been found that the vast majority of Tetraodontiformes have genomes comparable in size to those of most other bony fish, more than twice the size of the pufferfish's genome. Thanks to the fully researched family tree of this group, researchers have been able to determine that the small-sized genome does not seem to be connected with these fishes' extremely simplified body plans. The spiny pufferfish, the closest relatives in *Fugu*'s family, like *Fugu* are very simplified in body structure but have genomes almost twice as large.

Fugu's small genome size has made it a model organism for study of the vertebrate genome. When the sequencing is completed later this year, it should be possible to learn how many genes *Fugu* has, how many correspond to the genes present in humans, and what role "junk" DNA may play in other vertebrates.



Harry Wearne, whose printed textile collection was donated to the ROM in 1934, was one of the first to make the connection between prints on paper and printed textiles. He identified John Hoppner's 18th-century mezzotint (left) as the inspiration for the textile design shown below.



BRIAN BOYLE, ROM / 934.4.614

tales in

Novels and ballets, encoded political messages, and even tabloid scandals were all grist for the mill 200 years ago when artisans printed images on furnishing fabrics for fashionable homes

textiles

By Starr Siegele

Last January, as I was researching the ROM's celebrated collection of some 3000 printed textiles, I came across a photograph pasted to the back of one of them. It showed a mezzotint—a print of a painting—by 18th-century artist John Hoppner. In the print, English society bride Lady Sophia Heathcote was dressed as Hebe the Cup Bearer—the ancient mythological Greek goddess of youth and spring. Clearly, the print had served as the textile designer's model: the fabric itself is covered with the repeating image of Lady Heathcote as Hebe.

Beside the photo, English collector Harry Wearne—whose widow donated in 1934 the majority of the ROM's narrative textiles—made an annotation that reveals his pride in identifying the engraved print as the source of the fabric's design: "This remarkable example of mezzotint engraving was produced about 1810–20 by Steinback, Koechlin & Co. of Mulhouse, Alsace, one of the foremost printers of the period, whose work equals that of Oberkampf, or any other printer. A rare document."

Unknowingly, Wearne had taken his first step into a field that only today, more than 60 years later, is finally taking root—the study of print sources for 18th-century European decorative arts. He would have been amazed to learn about the many print sources I am now identifying that were used as models to decorate the textiles in the Harry Wearne Collection of Ancient Textiles.

On these fabrics, everyone from George Washington and Ben Franklin to the royal court of Marie Antoinette and Louis XVI as well as village children, shepherds, and their pets can be found. They mingle charmingly in scenes from everyday life, current events, or historic battles. Once you know how to interpret them, the narrative images that decorate more than 350 early furnishing fabrics in the ROM's textile collection serve as mirrors into all facets of life two centuries ago. Popular novels and classical literature, plays, ballets, and operas, even tabloid scandals, visual puns, and encoded political messages are represented on these fabrics, waiting to be rediscovered and enjoyed as they once were when they covered the walls, slip-covered the chairs, and draped the beds and windows of fashionable 18th- and early 19th-century homes in Europe, Great Britain, and North America.

In 1995, when I was first invited to study early printed textiles at The Art Institute of Chicago, I could not recall any of my colleagues in the print world writing about this intriguing subject let alone discussing it. As a curator of prints and drawings and a former printmaker, I seem to be the first from my discipline to cross fields to work on textiles. When the invitation came, I was deep in the middle of solving a mystery at the British Museum—I had found an unrecorded album of drawings from the Italian Renaissance. Somehow, it had slipped between the cracks and no one knew it was there. At the time, it was the most exciting discovery I had ever made. Little did I know how much my career was about to change, and that soon discoveries would be the stuff of my everyday life.

At my first meeting in the Art Institute's Department of Textiles, as the curator showed me photographs of 18th- and 19th-century printed fabrics designed for home furnishings, I immediately started making associations. Without thinking I'd blurt out "Oh! I think I know an engraving

on paper related to that textile design."

Only in the last few years, as I have systematically explored connections between prints on paper and prints on cloth—and studied the ROM's collection as a Veronika Gervers Fellow—have I realized the full extent to which designers of these yard goods were using engravings, etchings, and lithographs as their models. In virtually every case, images on the textiles can be explained if corresponding prints on paper can be found and their subjects identified.

The real challenge, of course, is making the match. Even then, the game is not always straightforward. Some textiles present a researcher with complex jigsaw puzzles: the most skilled designers might easily borrow ideas from many different prints to compose a single textile design. It sometimes takes years of patient hunting to gather all the pieces.

Some of the most complex designs were produced, not surprisingly, by the world's most famous manufacturer of printed textiles, Christophe-Philippe

COURTESY STAIR SAINTY MATTHIESEN INC.

discovering the Wyngaerts

Every research fellow privileged to conduct first-hand studies in the ROM's collections and archives dreams of uncovering within their riches some new key that will elucidate previous work in the field and open exciting paths for future research. Just such a discovery came during my own fellowship when I found signatures on three of the ROM's printed textiles—two of whose fabric designs I had never seen before. Although the signature on each piece was different, eventually I was able to associate all of them with a Flemish-born family of textile designers and manufacturers active in Bolbec, France, during the second quarter of the 19th century. Their name was Wyngaert (also spelled Winkaert). Most revealing, these ROM artifacts seemed to relate to a fourth textile at The Art Institute of Chicago that had been intriguing and perplexing me for several years. Although the design and manufacture of the Chicago piece appeared to be French, the interiors and costumes portrayed on it evoked Elizabethan England.

The first clue to the connection came when I noticed that one of the ROM's signed works—a cotton fabric dated 1827 and printed with scenes from the life of Henry IV—appeared similar enough in style to be a possible companion to the Chicago textile. The design on the Toronto textile was based on prints, themselves reproductions of the paintings *Henri IV et Sully chez Gabrielle* by Evariste Fragonard and *Henri IV chez Michaud* by Alexandre Menjaud.

It is frustrating but not unusual that furnishing fabrics decorated with narrative scenes have often been described rather vaguely. When I began to study Chicago's printed textiles, I noted that the Elizabethan-looking one was designated as "scenes from Shakespeare." Only after I had seen the ROM's signed artifacts did Wyngaert's signature become clear; the design was not even described in any of the literature on textiles. I still have not found an example of it in any other collection.

Over time, I was able to identify each of the four prints on paper used as models for the textile in Chicago. As it turns out, the images are all scenes from British literature depicted in paintings of the early 1820s by Henry Joseph Fradelle and reproduced as engravings in 1827 by Jean-Pierre-Marie Jazet: Othello telling his life story to Desdemona from *Othello* by William Shakespeare; Belinda at her dressing table from *The Rape of the Lock* by Alexander Pope; and two illustrations from novels by Sir Walter Scott—Mary Stuart and Chatelar from *The Abbot* and Leicester visiting Amy Robsart from *Kenilworth*.

Once a textile design's sources and subject have been identified, my next step is to consider its context. In consid-

Oberkampf. A German Protestant who immigrated to France via Switzerland in 1758, 20 year-old Oberkampf already showed signs of becoming a brilliant entrepreneur. He set up shop conveniently close to the royal court at Versailles in the village of Jouy-en-Josas. Born into the textile business, Oberkampf had trained through the ranks. He was a fast study, both clever and practical. And luck was on his side. The year after Oberkampf moved to France, a 73-year French ban on printed cloth—imposed in response to a strong lobby by the manufacturers of silk, wool, linen, and hemp who feared their customers' infatuation with cheaper printed cottons would ruin their businesses—was finally lifted. Opportunity abounded for a young man with textile-printing know-how, which had been largely lacking in France since 1685, when the Edict of Nantes was revoked, resulting in an exodus of the Protestant population, including many skilled textile workers.

Astutely, Oberkampf, after many years of commissioning designs from various artists, hired one whose

COURTESY THE ART INSTITUTE OF CHICAGO

BRIAN BOYLE, ROM / 934.4576A

Opposite page: Left: This painting of Mary Stuart visiting Chatelar by Henry Joseph Fradelle was the inspiration for one of the scenes printed on a textile from The Art Institute of Chicago, shown beside it. **Above right:** The ROM's textile depicting scenes from the life of Henry IV and signed by Wyngaert helped identify the Chicago textile, shown in full at left.

ering why British tales would be depicted on French toiles, I found that in France in the years following Napoleon's defeat, a vogue for everything English swept the country. A fascination with historical novels and plays, particularly those set in the Middle Ages and the Renaissance, a preoccupation with sentimental anecdote, intimate format, details of historic costume and decor—all presented in a refined, miniaturist technique—were elements of the popular painting style typified on the Art Institute's textile, a genre that later came to be known as "Troubadour."

It also occurred to me in looking for context, that each of the female characters portrayed in the textile design had been betrayed by a man. Who can't imagine the angry woman who might have commissioned such a fabric? Picture it covering her bedroom walls, draping the windows, upholstering the chairs, and, especially, swathing her great bed and its canopy like a tantrum! However, it is more likely that these tender but provocative scenes were purposely selected by the textile manufacturer to cater to clients fascinated with themes that idealized past heroines. Women writers and painters became significant proponents of the Troubadour style's retrospective romanticizing. It is easy to understand why the genre had a natural appeal to feminine sentiment.

Given that so many early printed textiles illustrated contemporary theatrical themes, it was not surprising to discover that Chicago's "Scenes from British Literature" and Toronto's "Henry IV" both reflect performances presented in France during the 1820s. In 1823 de Plannard's comic opera "Marie Stuart en Ecosse" opened at the Feydeau Theatre in Paris. Anglomania encouraged renewed interest in Shakespeare and a travelling English theatre troupe was received with enthusiasm in 1827 (the actual date inscribed on Jazet's print series and on the ROM's artifact). The following year, the famous French author Victor Hugo adapted Scott's *Kenilworth* for a staging of *Amy Robsart*, with costumes designed by the equally renowned painter Eugène Delacroix. These facts connect neatly to provide a sound basis for dating the Art Institute's textile with the ROM's "Henri IV"—around 1827-1828.

What began during my Gervers Fellowship with a visual association and then with my identifying the Wyngaert name on four printed textiles in Toronto and Chicago has led to a remarkable expansion of our knowledge of that family's contribution to the printed textile industry. With the collaboration of French and American colleagues, it has been possible to assemble from our respective collections an inventory of 27 printed textile designs signed by the Wyngaerts.

BRIAN BOYLE, ROM / 934.4.447

The design for the ROM's textile "American Liberty," seen in the background, was created by designer Jean-Baptiste Huët, who drew inspiration from the works of more than 15 artists from various countries and epochs. A few close-ups from the textile are shown beside the prints he used as models. **Left to right:** "Girl Milking Goats" by Johannes Visscher after Nicolaes Berchem; "Sheep and Goats," "The Little Shepherd," and "The Laundresses," all by Gilles Demarteau, after François Boucher.

skill and instinct for designing printed fabrics was unequalled in France or England—Jean-Baptiste Huët. Their highly successful partnership lasted from 1783 until the artist's death in 1811. So renowned were the printed cottons they created at Jouy-en-Josas that the term "toiles de Jouy" came to be used generically.

Huët was a painter, draughtsman, and tapestry designer with a gift for portraying animals. He was also a prolific printmaker. Huët had assembled a large collection of contemporary and Old Master prints that we now know he tapped regularly as models. I have no doubt that Huët's hands-on experience with printmaking contributed significantly to Oberkampf's success.

The painstaking process of printing on fabric began with an original "cartoon" or design drawn by the artist, which would then be transferred by an engraver onto a copperplate and engraved. A note in Oberkampf's archives describes the technique: "An engraver must know at least the rudiments of drawing so that he can trace the design accurately on the sheet of oiled paper that is provided, and then transfer it onto the plate, using a stylus and a sheet of paper darkened with oil and lampblack." The tools and techniques for engraving were essentially the same as those used to print on pa-

per, and much of the technology of textile printing derived from the book trade. But whereas paper could be printed directly using the oil-based printers' inks familiar to the book trade, for cloth to be colourfast it had to undergo many more steps. The blank cotton fabric had to be specially prepared to make it receptive to the design; first it was printed with carefully thickened mordants (iron and aluminum salts); next it was dipped in a dye bath and then it was washed in water to clear any superfluous colour away from the design. Finally, the printed textile was laid out in the sun to be dried and bleached.

Huët understood exactly how to prepare a cartoon for the engraver: with precise graphic rendering and by minimizing the detail, he shortened the time needed to engrave the copperplate, and so reduced costs for the manufacturer. The larger, more complicated plates—up to a metre square—could take several months to engrave, and speed was essential, particularly if the subject matter concerned a breaking news event.

Oberkampf himself had an instinctive ability to sense a new trend almost before it happened, and with the help of Huët's skills was often the first to seize advantage on the market. His textile depicting scenes from *The Marriage of Figaro*, for example, may mark the first performance ever printed on a French furnishing fabric. It must have sparked a huge fad among decorators catering to the culture mongers of the day. As my sleuthing reveals the context of one picture after another on these printed fabrics, I continue to be amazed at how many of them commemorate performances of the day.

Banned in France when it was written around 1776 by Pierre Augustin Caron de Beaumarchais (1732–1799), *The Marriage of Figaro* circulated in pirated editions in Europe for years. The multi-talented de Beaumarchais's audacious script carried a timely political mes-

sage so derisive of the old regime in France that it incurred the royal censor. Finally, during the spring of 1784, his stage play was allowed its public premiere in Paris (Mozart's famous comic opera adaptation debuted two years later in Vienna). Oberkampf moved quickly to base his fabric's design on some of the prints commissioned for the two earliest French editions of the play, both published in 1785. The books' principal illustrators were Parisian engraver and print dealer Thomas-Charles Naudet and the genre and landscape painter Jacques-Philippe Joseph de Saint-Quentin.

Sometimes attributed to Huët, the original drawing for the Figaro textile mostly exhibits a style quite different from Huët's—though its anonymous draughtsman did not lack a subtle sense of humour. Politically sensitive scenes are played under an elaborate stage curtain appropriated directly from a print done of a painting by Jean-Antoine Watteau, the earlier 18th-century Belgian-born painter who had most successfully romanticized the *ancien regime* in France. Only some of the broader, surer strokes–defining a couple of cherubs, a girl with a pet lamb, and her male companion piping a tune for his dog—might indicate Huët's correcting hand on the sheet. In fact, the same young musician—a figure inspired by a Boucher print—appears in two other designs Huët prepared for Oberkampf that year.

No other designer of printed textiles ever approached Huët's unique ability to transform however-many disparate parts into such a charmingly cohesive, personal style. One early product of the Oberkampf-Huët collaboration—called "American Liberty" or "The Franklin Peace Medal"—introduces in dizzying array many of the themes the manufacturer and artist would explore over their 28-year collaboration. The ROM's example bears the mark of Oberkampf's famous factory—with its proud display of the King's stamp of approval—signalling the zenith of textile printing. What looks on the surface like an easy, breezy pastoral scene, is in fact an incredibly complex composition. Its seamless, graceful motifs are assimilated from the works of more than 15 artists from various countries and epochs.

Much has already been written about the namesake medal conceived by Benjamin Franklin while he was in France negotiating a Franco-American alliance against Britain. But no one has much noticed how many other timely references abound on the textile. It pays due homage to the preceding generation of court artists such as François Boucher. Several of Boucher's laundresses appear here along with his young mother feeding her chickens. And, of course, we recognize the little musician and his dancing dog—this time joined by an expanded audience of farmyard livestock and exotic monkeys. Some of these gentle critters were gathered from prints etched either by Huët himself, or by his mentor, Gilles Demarteau, who gave Huët his first major job painting murals for Demarteau's Paris townhouse salon alongside the well-known artists Fragonard and Boucher.

Other images in "American Liberty" derive from engravings made by or after 17th-century Dutch and Flemish artists. Huët particularly admired Nicolaes Berchem (1620–1683) and Philips Wouwerman (1619–1668): hundreds of their works are listed in the inventory of his art collection. In addition to many of the sheep and goats, there are other motifs whose sources can be found in these prints: the milkmaid, a frisky dog pulling the little boy holding his leash, another pup enjoying his ride in the bow of a rowboat, and a dashing horseman in a fine feathered hat.

In drawing a visual connection between republican ideals of liberty and a simple lifestyle, close to nature, Huët was alluding to the popularly embraced philosophy of Jean-Jacques Rousseau (1712–1778), which equated rustic culture with virtue, equality, and freedom. Happy, lowland peasants from an earlier era were perceived as exemplars of a natural democracy. The public's rush to collect paintings by the earlier Dutch and Flemish masters of these themes quickly produced a demand on 18th-century printmakers to reproduce the bucolic images—which inevitably turned up on printed textiles. During the 1770s and

These prints of "The Fable of Psyche" by anonymous Italian engraver Master of the Die were obviously the models used to decorate the textile (opposite page, left) created by the renowned artist/manufacturer team of Huët and Oberkampf.

1780s, Rousseauian concepts of landscape architecture also took hold, and the "natural" park-garden became a familiar backdrop for many textile designs.

The dancing nymph playing a tambourine seen on "American Liberty" derives from a more classical tradition—and is based on a wall painting discovered during the archaeological excavations of Herculaneum in the 1740s. These excavations along with the discovery of Pompeii fired interest in ancient Greek and Rome. Unless Huët used an intermediate source, he undoubtedly copied the nymph from plate 21 in *Le pitture antiche d'Ercolano e contorni* (published in Naples, 1757), a popular catalogue that illustrated many of the findings at Herculaneum. Huët's own collection from which he drew inspiration included not just paintings, drawings, and engravings but also actual antiquities—vases, coins, and a considerable variety of ancient medals and plaques—along with contemporary recreations popularized by decorative artists such as Wedgwood.

Classical themes became more important with Napoleon's rise to power in the years following the French Revolution of 1789. Purposefully, Napoleon evoked ancient Rome, a style he affected for his empire, and it was no accident that antique subjects increasingly came to dominate art and decoration. Fortunately, several of Oberkampf's letters of instruction have survived, illuminating how current events and other market trends influenced the creative process. After the revolution, Oberkampf wrote Huët that he wanted to participate in this new trend for images reminiscent of ancient Greece and Rome—the growing taste for neoclassical design. Huët promptly changed course and obliged with compositions derived from catalogues that illustrated artifacts amassed by 18th-century collectors of antiquity. He also looked to the Italian Renaissance.

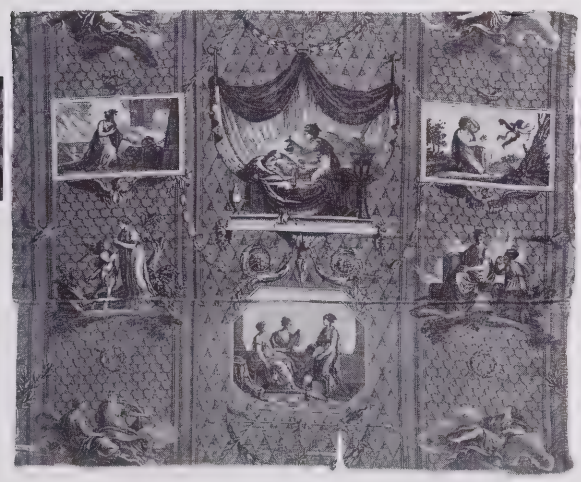
In Renaissance master Raphael's day, similar excitement had been spurred by the discovery of ceiling and wall paintings in the ancient Golden House of Nero, country palace of the infamous Roman emperor who died in 68 AD. Raphael and the artists working in his studio incorporated many of the things they saw in Nero's palace in their own paintings, which were in turn reproduced many times over in prints on paper—and ultimately in the textile prints Huët designed for Oberkampf.

One such Huët design for a textile printed with "The Story of Cupid and Psyche" derived most of its motifs from a series of Renaissance engraved prints known as the "Fable of Psyche," made and published in Rome around 1532 by Augustino Veneziano and the anonymous Italian printmaker, Master of the Die. The engravings themselves were based on other drawings by Flemish painter and tapestry designer Michael Coxie, following Raphael's ideas.

French printmakers copied the series during the 16th century and again in 1802 and 1809. Huët interpreted them for Oberkampf around 1810 when the reproductions were undoubtedly intended to capitalize on another event: the Paris exhibit of a stunning set of stained-glass windows created in 1543—and based on the Coxie/Raphael designs—for the Psyche Gallery at the Chateau d'Ecouen in the area of Val d'Oise. The windows remained on view in Paris until 1816 (today they can be seen at the Musée Condé in Chantilly).

Huët's ambitious textile composition for "The Story of Cupid and Psyche" was his final work for Oberkampf—he died later that year. By the time of Oberkampf's death four years later, the centre of the printed textile industry had already shifted to Normandy and Alsace. Perhaps, as British collector Harry Wearne attested, the Alsatian successors achieved excellence in the quality of their printing. But, although designs were commissioned from an array of respectable artists, no one ever again proved capable of producing the harmony and charm of the printed textiles created by Christophe-Philippe Oberkampf and Jean-Baptiste Huët at Jouy-en-Josas. •

Starr Siegele's findings for this article have been greatly aided by The Oberkampf Archives at La Fondation Pour l'Histoire de la Haute Banque, Paris, and by Monsieur Xavier Peticol of Saint Pandelon and Paris.



BRIAN BOYLE, ROM / 934.4.542

SOLDIERING ON

As a boy, **K. COREY KEEBLE** collected toy soldiers. Today his fascination endures. Herewith, an excerpt from the book he has written on the miniature objects that captivate collectors, connoisseurs, and historians alike.

FROM 1951 TO 1957 my family lived at 206 Wavell Avenue in Winnipeg. Our neighbours at 210, Ted and Gwen Hubbell, provided a fascinating introduction to the history of hollow-cast toy soldiers. Mr. Hubbell, a major in the Canadian Army in World War II, had saved his childhood collection of toy soldiers, which he kept in a large leather case, rather like a Gladstone bag. Seeing the major's soldiers spread out on a carpet was an inspiration.

There were examples of horse artillery, soldiers in World War I khaki uniforms and field caps, marching figures in dress uniform, and so many others it makes my head spin to think of them all. They showed all the marks of a long service life. They were mildly dented and chipped, and some had lost heads and legs, which had been scrupulously re-attached. Sometimes a missing limb had been replaced by a wooden matchstick, which made a perfect peg-leg.

At about the same time I began acquiring my own small collection. Boxed sets of infantry, cavalry, and artillery, usually lead-alloy soldiers made mostly by Britains Ltd., were given to me at Christmas and birthdays by my parents, other relatives, and the Hubbells. My parents were remarkably generous in this respect. The major insisted that the ones he and his wife gave me should be accompanied by sandbags. Mrs. Hubbell dutifully cut lengths of khaki cloth into appropriate sizes, sewed the miniature sacks together, and filled them with sand. She provided dozens, but when she asked her husband how many would be needed, ideally, he smiled and said, "Hundreds!" They were set up on our green living-room carpet near the Christmas tree, as enclosures for the ranks of machine gunners and the riflemen hidden behind them.

Shortly after their introduction in 1954, two knights on horseback and a box of knights on foot, both from the "Knights of Agincourt" series,

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Top: Gun of the Royal Artillery (Set 1263); **Bottom:** The Argyll and Sutherland Highlanders (Set 2063)

joined my collection. They were among the most treasured possessions of my entire childhood.

One Christmas the expected lead-alloy soldiers were complemented by a box of Guardsmen made of orange-red plastic. The box bore the Herald label. Our fox terrier, Scamp, ran off with one of the guardsmen; it was eventually recovered, little the worse for wear except for a few tooth marks.

I never imagined that years later, now a curator in the Museum's Department of Western Art and Culture, I'd have the opportunity to study a fantastic gift of nearly 5000 historic toy soldiers given to the ROM in 1991 by Hal Jackman, during his tenure as Lieutenant Governor of Ontario. Manufactured between 1893 and 1966 by Britains, the most famous maker of toy soldiers in the world, the Jackman Collection includes various accessories—one of which is a pile of miniature sandbags.

The history of toy soldiers is intriguing. To begin with, modern collectors, connoisseurs, and historians tend to differentiate between "toy" soldiers and "military miniatures." The differences are well illustrated by the items that Mr. Jackman collected. In 1991, besides donating his sizable collection of toy soldiers to the ROM, he gave his collection of military miniatures to the Royal Canadian Military Institute. The miniatures are individually crafted small sculptures; each is an accurately detailed imitation of an authentic historic prototype. Such figures are often literally one of a kind.

By contrast, toy soldiers were normally made from standard models and produced in quantity for reasons of economy. They are usually less detailed than military miniatures. Most significantly, toy soldiers were normally intended to serve as playthings for children. Historic toy soldiers, such as those in the Jackman Collection, tend to show some wear and tear associated with child's play, for instance, some chipping of painted surfaces, bent swords and bayonets, and occasional dents inflicted by the projectiles of toy artillery.

While primarily designed for children, the toy soldier remains intimately related to other forms of sculpture in miniature. The manufacture of models from moulds is analogous to the production of metallic and ceramic sculpture, while the history of toy soldiers impinges on that of other forms of sculpture intended for serious religious functions.

In ancient Egypt, painted wooden figures of soldiers were placed in tombs to render service in the afterlife. Similar practices were followed in China, where ceramic statuettes of soldiers were enclosed in tombs. As is known from recent archaeological work, the Chinese figures range in size from small statuettes to life-size forms. Historians tell us that small lead figures of soldiers designed as toys were made during the period of the Roman Empire. During the Middle Ages in Europe, small figures of knights were made as toys. They may have been made in wood, but small cast-metal figures of jousters actually survive from the Late Gothic era. Children are shown playing with toy jousters in woodcuts by Burgkmair that illustrate *Der Weisskunig*, one of a series of books commemorating the life and activities of the Hapsburg Emperor Maximilian I. Two toy knights on wheeled mounts, dating from c. 1500, are in the Kunsthistorisches Museum in Vienna.

These small figures served a quasi-serious purpose in introducing children of the aristocracy to the arts of war. Military training was but one of the many arts considered important in the education of a Renaissance prince or courtier, certainly as such education conformed to the concepts set forth by Baldassare Castiglione in *Il*

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Part of the U.S. Marine Corps Band (Summer Dress) (Set 2112)

Cortegiano. As visual aids to learning tactics and strategy, toy soldiers existed alongside chessmen, some of which by tradition are of martial type (e.g., pawns and knights).

In Baroque Europe, toy soldiers formed part of the appanage in the training of absolute monarchs. Louis XIII of France had a set of 300 small-scale soldiers. Befitting his rank, they were made of solid silver. Louis's collection, which included miniature pieces of artillery, may have been used as toys, but also served to bridge the gap between innocent play and the more serious business of mastering concepts relating to tactics and strategy.

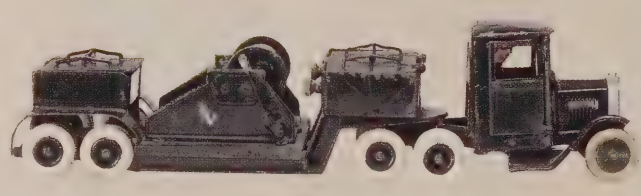
During the decades reaching into the 1700s, small-scale figures of soldiers were made in wood, wax, and sugar, as well as metal. The wax and sugar figures, at least in their materials, relate to the small-scale sculptures used as table decorations for festive occasions. As such, they relate to the realm of small-scale sculpture that includes the Renaissance bronze statuette and its spinoffs, and the Baroque and Rococo porcelain statuettes, which eventually replaced the perishable statuettes of wax and sugar on dinner tables.

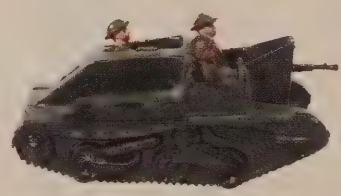
Historians agree that the direct antecedents of the modern toy soldier originate in Nuremberg around 1730, when pewterers or tinsmiths began to produce thin castings in the form of soldiers in slate moulds. For obvious reasons, these 1-mm-thick figures are known to English-speaking collectors as "flats." Some historians suggest that the production of flats began as a sideline of pewter production. In any event, the use of standard slate moulds permitted flats to be made in quantity. Their manufacture increased toward the end of the 1700s, and has continued to the present day. The production of flats is associated with known makers such as Johann Gottfried Hilpert, a Nuremberg tinsmith active in the 1770s who is regarded as the father of the toy soldier as it would evolve into the modern era.

While lead or lead alloy is the material most often associated with toy soldiers, numerous other materials have been used as well. During the 20th century, various makers experimented with aluminum, plastic, plaster, papier-mâché, glue, and pumice. During the early 1900s the German firm of Otto & Max Hausser, under the "Elastolin" trademark, turned out a wide range of figures in a composite of sawdust, kaolin, and glue moulded around wire armatures.

The majority of the toy soldiers in the Jackman Collection are of Britains manufacture, and date from the great period of lead-antimony production, 1893–1966. The collection embraces every phase of the company's history and development, and documents the armed forces of the United Kingdom, the British Empire, the Commonwealth of Nations, and the nations of the world.

What is the appeal of toy soldiers? Not surprisingly, the answer is complex. As far as collecting historic toy soldiers, there is undoubtedly an element of nostalgia and sentiment for a vanished age of childhood. Mere nostalgia, however, cannot adequately explain interest in the field. In a day before television and the Internet, toy soldiers provided a remarkably efficient form of communication concerning world events. Britains Ltd.'s documentation of world political events was surprisingly up to date. Boer War figures, for instance, were in production even as the events they documented were taking place. History, geography, and political events were made present in an immediate and comprehensible form to generations of children and their families. Britains Ltd. opened a window on the world, as its toy figures related to





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Left: Heavy Duty Underslung Army Lorry (Set 1641); **Right:** Bren Gun Carrier (Set 1876)

virtually every known nation and region. Toy soldiers provided an immediate, accessible microcosm of world culture and world events.

Many of the soldiers made by Britains Ltd. recorded dress uniforms and bands of the world's armies, providing an intriguing focus on peacetime rather than wartime activities. The number of military bands in the Britains catalogues is astonishing, and figures of bandsmen make up a sizable and visually impressive component of the Jackman Collection now in the ROM.

It is not surprising that so many Britains toy soldiers documented the regiments and uniforms of the United Kingdom. What is particularly delightful about the range of Britains figures, however, is its almost dizzying, kaleidoscopic coverage of other cultures. Among the most fascinating are figures of Indian Army troops, which include the world-famous Bengal Lancers, the Bikanir Camel Corps, the Madras Infantry, and Sikh and Gurkha regiments. Canadian regiments are documented in detail, and include figures of the Governor General's Horse Guards, Princess Patricia's Canadian Light Infantry, and the Fort Henry Guards, as well as the Royal Canadian Mounted Police in winter and summer dress. Among the most interesting of Britains African figures are The King's African Rifles (Set 25) with its marching figures shown in tasselled red fezzes, and two Egyptian sets: Egyptian Cavalry on horseback (Set 115), and the Egyptian Camel Corps (Set 48).

Although well researched, there were occasional slips in accuracy of detail and colour. One of the most conspicuous examples is provided by the Greek Evzones (Set 196). From 1919 to 1940 they were inaccurately shown with red-painted tunics or vests. When the set was revived after World War II, the vests were painted the correct black colour. On sets of Irish Guards, the correct plume colour for the bearskin caps is blue, but on some early Britains's figures, the plume was painted green. The errors were minor and in general the accuracy of Britains's remarkably wide range of sets and figures was a phenomenon to be admired and praised.

Declining demand and laws prohibiting the use of lead in toys resulted in Britains Ltd. closing down its traditional lead-antimony toy soldier division in 1966. This was not the end, however. Subsequently Britains—using non-lead alloys—recommenced toy soldier production with limited-edition and other sets designed more for adult collectors and connoisseurs than for children. At the same time, enthusiasm for the original Britains figures made between 1893 and 1966 has steadily mounted. Renowned auction houses such as Sotheby's and Christie's now do a fearsome trade in historic toy soldiers by Britains and other makers. The establishment of the Forbes Collection, the world's largest, provided a stimulus for toy soldier collecting on an international scale among stockbrokers and captains of high finance, but modern enthusiasts are a veritable cross-section of world society. Trade fairs focusing on historic toy soldiers are known everywhere, while countless numbers of hobbyists and collectors now make their own cast-metal figures.

EVENTUALLY, MY OWN TOY SOLDIERS were put away, but many of them have been preserved, even the Herald set with the one tooth-scarred figure. They remain to this day as a reminder of a golden age of toy production, which was even in the mid 1950s nearing its end. Who would have imagined then that the lead-alloy toy soldier would be resurrected as one of the most eagerly sought collectibles. •

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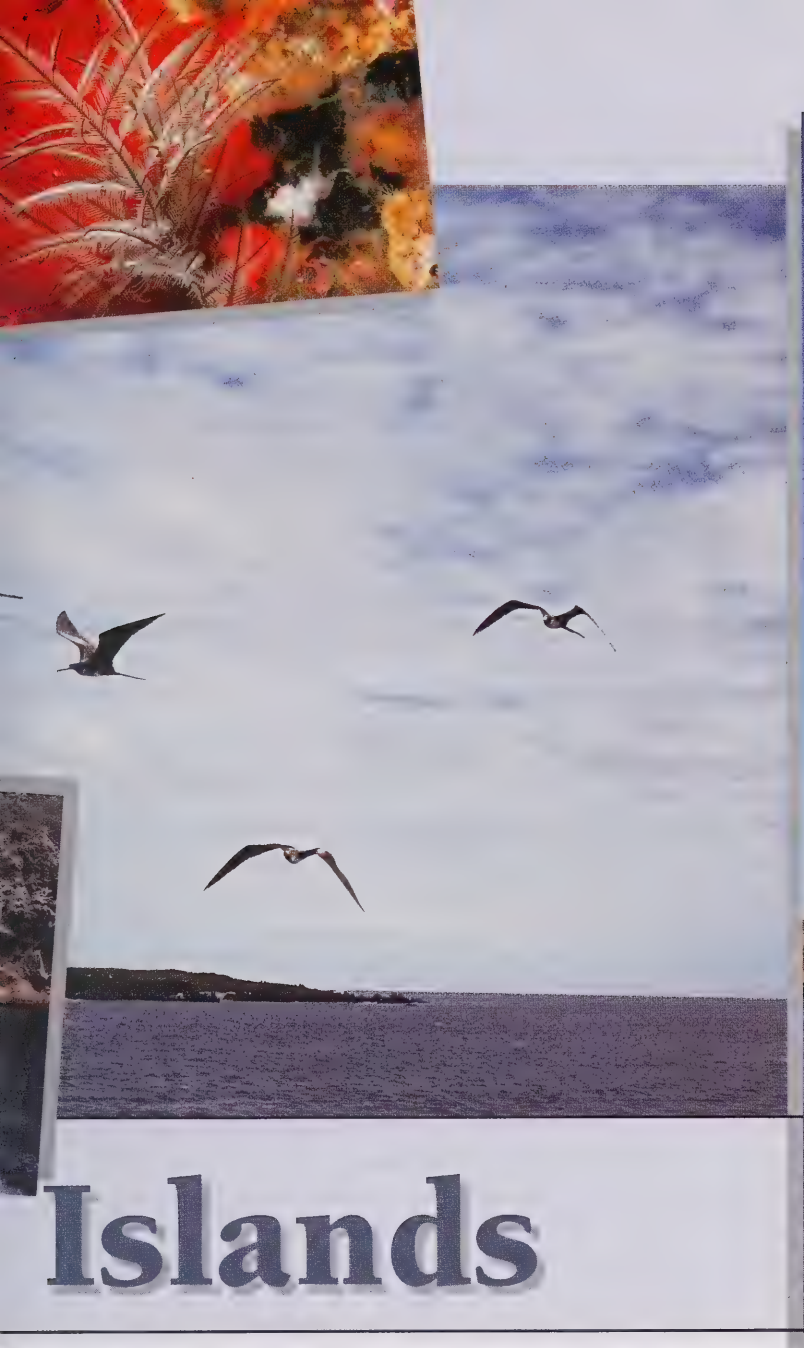
Left: 14th-Century Knights by Charles C. Stadden; **Right:** The West India Regiment (Set 19)

Treasured

Straddling the equator, the Galápagos Islands teem
So writes invertebrate zoologist Dale Calder, after a
plant-like marine animals in this ecologically rich a

By Dale R. Calder

AFTER A 14-HOUR OVERNIGHT JOURNEY from Isla Fernandina, westernmost of the Galápagos Islands, our trusty research vessel *Beagle* arrived at dawn on the north side of Isla Pinzón. Three rocky pinnacles lie just to the north of the main island, and after a reconnaissance our group of five marine biologists decided to collect samples there before breakfast. The morn-



Islands

Las Islas Encantadas—the enchanted Galápagos Islands. **Left to right:** Punta Vicente Roca at the northwest tip of Isla Isabela; frigate birds at sea; biologists depart for a dive aboard an inflatable dinghy; specimens of a hydroid *(Macrorhynchia philippina)*; Pinnacle Rock on Isla Bartolomé, a Galápagos landmark.

with the unexpected. week of collecting nd fragile archipelago.

ing air was clear and bright and the air temperature, in the low 20s, surprisingly comfortable. After two days of diving in chilly waters off Fernandina and western Isabela, with water temperatures as low as 17–18 °C, this felt warm by comparison. Anywhere in the islands, the climate made it hard to believe we were so close to the equator.

We were here in the Archipiélago de Colón, better known

as the Galápagos Islands, some 1000 kilometres (620 miles) west of mainland Ecuador, at the invitation of Dr. Cleveland Hickman of Washington and Lee University in Virginia. Cleve has been carrying out marine research on the islands since the 1970s, writing both scientific and popular guidebooks on the molluscs, echinoderms, and decapod crustaceans of the region. Now, he was preparing another guidebook on corals, hydroids, sea anemones, and related species.

I was invited because identifying and classifying hydroids—a group of plant-like, mostly marine animals—is my specialty. Cleve also invited Dr. Daphne Fautin of the University of Kansas, an expert on flower-like sea anemones. I knew Cleve was well connected and well respected for his work in the archipelago. Even better, he had already begun the process of acquiring permits and planning the trip through the Charles Darwin Foundation for the Galápagos Islands in Ecuador.

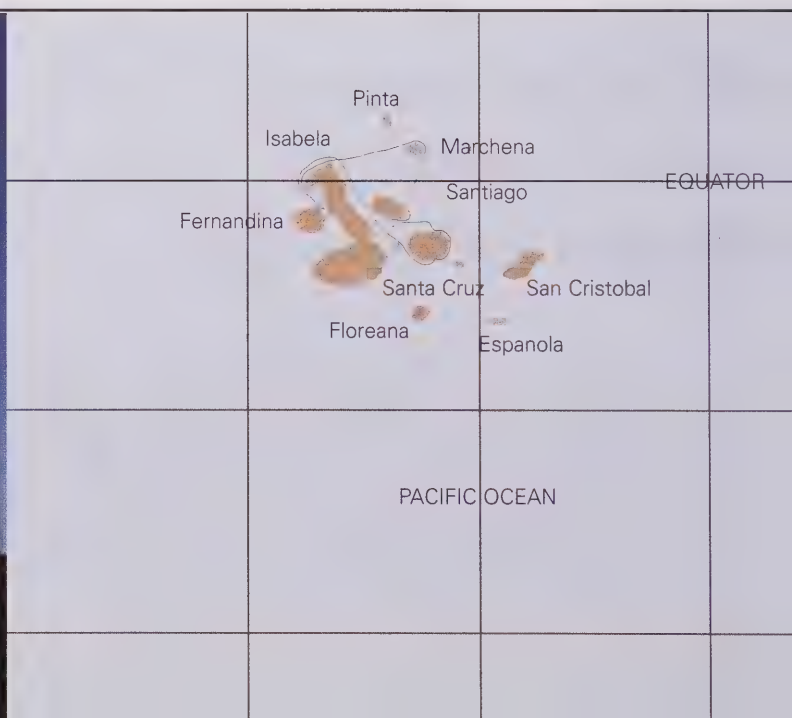
For a biologist, visiting these famous islands and seeing the species that inspired Darwin is a rare privilege. Acquiring the scientific permits for field studies in this ecologically fragile place and arranging the logistics of such work, however, is so difficult and time-consuming that I had never seriously considered applying. Given the fragility of the islands, conservation is crucial (see "Conservation on the Galápagos Islands," page 39). More knowledge is needed about the ecology and biodiversity of the area to better protect its unique flora and fauna. But the prospect of ever doing research here myself seemed as remote as the islands themselves, until I received Cleve's invitation early last year. Was I interested? Was Mozart a musician?

When Darwin himself visited the area in 1835 aboard HMS *Beagle*, he came ashore to a veritable living museum. The extraordinary bird species, including the rare Galápagos flightless cormorant and Darwin's finches, were inspiring. Thirteen species of these small finches, differing mainly in bill structure and feeding habits, are found here and nowhere else. The unique and highly endemic Galápagos wildlife provided the spark that led Darwin to formulate his theory of evolution. No other hypothesis has had a more profound impact on the science of biology.

On our own trip, my work was to investigate the biodiversity and ecology of hydroids—which belong to a major group or "phylum" of invertebrate animals known as Cnidaria—in waters around this rugged and volcanic chain of islands. Cnidaria also includes corals, sea fans, sea anemones, jellyfishes, and their relatives. An important part of the sea's food web, 3200 species of hydroid are found worldwide. Fire corals, familiar to divers for their painful sting, are really hydroids, not true corals. The "airferns" often sold in florist shops are actually a species of air-dried and green-dyed hydroid. Plant-like in appearance, hydroids usually attach themselves to and grow on submerged objects. Like zebra mussels, barnacles, and algae, they can become pests, fouling the bottoms of ships and the cooling-water intakes of industrial plants. A few, like the fire corals, are venomous to humans. Others may hold potential in biomedical research. The ROM is one of the few places in the world where studies are carried out on these obscure "lower invertebrates," and our collections are among the best anywhere. I knew that compiling an inventory of hydroids in the Galápagos would be useful for other biologists in assessing the overall biodiversity of the islands, baseline data so necessary to understanding how the region's ecosystems operate and how best to protect them.

The archipelago is a kind of living Jurassic Park—without the dinosaurs. Instead, a panoply of odd species, many of them found nowhere else on earth, dwell on land and sea. Dragon-like marine iguanas, fearsome in appearance only, inhabit the islands' shores and, astonishingly, penguins and fur seals live astride the equator on these islands: their closest relatives inhabit frigid coasts 6000 kilometres

DALE CALDER



(3720 miles) or more to the south. Most conspicuous are the archaic-looking Galápagos tortoises. With shells approaching the size of bathtubs, these ponderous herbivores grow to more than 200 kilograms. It's for these gentle giants that the archipelago is named: galápago is Spanish for tortoise.

Biologists know that the terrestrial life of the Galápagos, studied extensively over the past couple of centuries, is enigmatic. But the marine environment and sea life of the islands, much less investigated, is downright paradoxical. Though the archipelago straddles the equator, where you might expect to find balmy waters, extensive reefs, and an explosion of biodiversity, neither the surrounding waters nor the resident sea life are typical of the tropics. The coral reefs are localized and little developed. The diversity of marine fauna and flora is comparatively low, and many species that are widespread in the tropical Pacific are absent altogether. And yet, at the same time, marine productivity and fertility is higher than might be expected in an equatorial region.

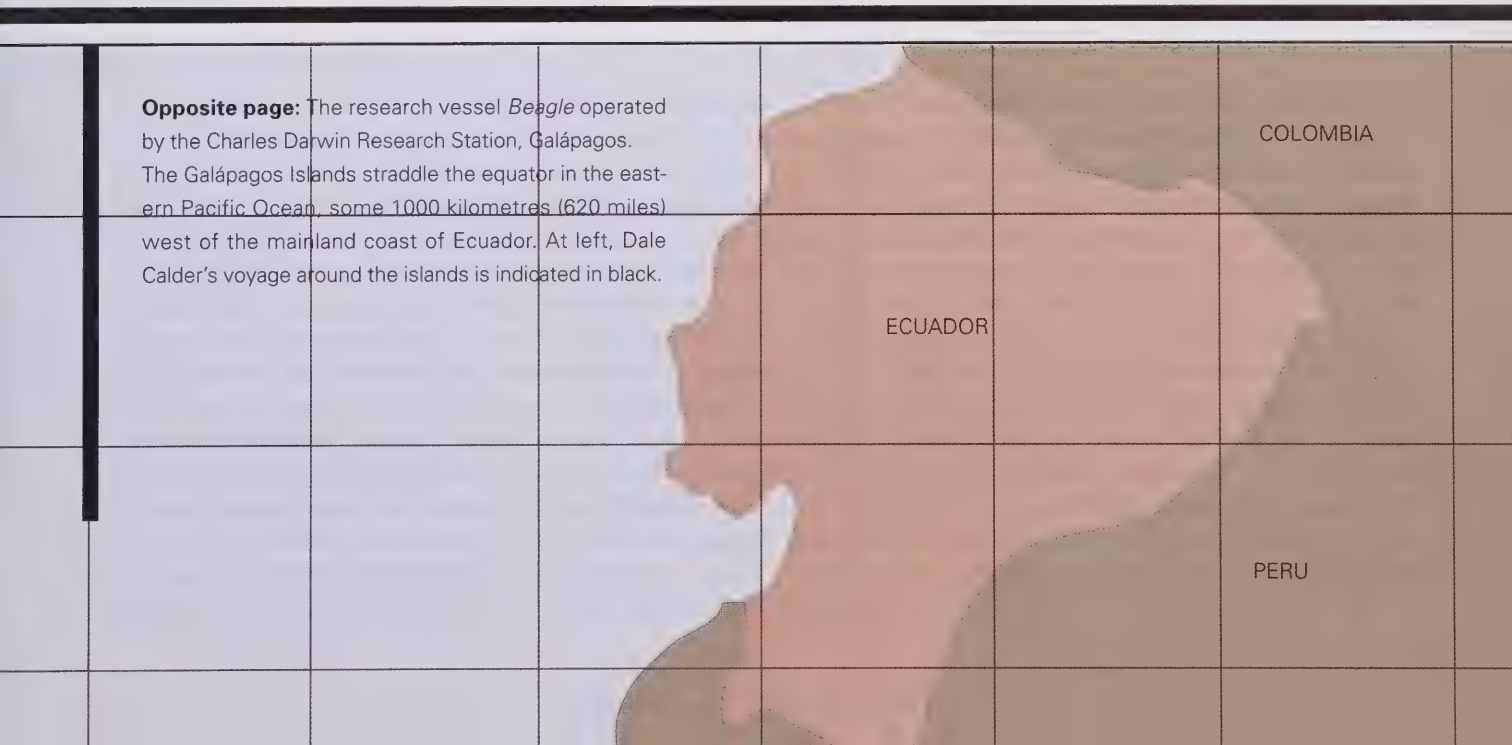
As well, the marine climate of the Galápagos shifts drastically every few years when El Niño or ENSO (El Niño-Southern Oscillation) events hit (see "What Makes the Galápagos Waters So Cold?" page 38). While the increased rainfall associated with El Niño is a boon to parched terrestrial life, resulting changes in the marine environment have the opposite impact on most sea life. A sudden shift from waters that are cool and nutrient-rich to ones that are warm and nutrient-poor is little short of catastrophic. Even coral species, which might be expected to thrive in the suddenly warmer waters, are severely affected by the quick switch.

During a particularly intense ENSO in 1982–1983, scientists estimated that more than 50 percent of the corals died. The reefs, sparse and underdeveloped to begin with, have never fully recovered. And in turn, the decimation of algae and marine invertebrates is devastating to sea birds, marine iguanas, and marine mammals. As for strictly tropical species that invade the area during these warm spells, few seem to survive the return of more typical conditions. The stress of such climate disruptions limits sea life to species—such as some of the hydroids—able to withstand a wide range of conditions. I was keen to investigate which hydroids could survive here, and I silently thanked the private donor whose generous support made it possible.

Once we arrived with all our gear intact, we—three crew, three scientists, and two volunteers—spent seven days at sea. Our 12.6-metre (42-foot) research vessel *Beagle* proved dependable, if somewhat cramped. The Ecuadorean crew turned out to be competent, hard-working, and pleasant. The weather was good and the water visibility clear. We dove without accident. With the abundance of hydroids, the collecting was superb. We travelled to and collected around three large islands (Isabela, Santa Cruz, Fernandina), two medium-sized islands (Marchena, Pinzón), and five smaller islands and rocks (Rocas Gordon, Daphne Chica, Rábida, Roca Cousín, Plaza Norte). At all, the sights were truly spectacular.

On the morning we set out to dive at Isla Pinzón, we prepared by assembling our collecting gear: bottles, bags, underwater camera, strobe, note-recording pads. Next we organized our diving gear, securing a full air tank to each buoyancy compensator, and checking tank pressure and air flow. Then came the most onerous part of any dive—struggling into our cumbersome gear. Wetsuits, dive boots, weight belts and weights, diving knife, and finally air tank and buoyancy compensator all went on.

It wasn't so cold that I needed a hood, but with my 7-mm- (1/4-inch-) thick wetsuit, 12.6 kilograms (28 pounds) of lead weights were required on my weight belt to keep me neutrally buoyant in the water. After strapping on a full tank of air, too, I felt as though the weight of the world was on my back. I could hardly breathe. It was getting hot in this neo-



Opposite page: The research vessel *Beagle* operated by the Charles Darwin Research Station, Galápagos. The Galápagos Islands straddle the equator in the eastern Pacific Ocean, some 1000 kilometres (620 miles) west of the mainland coast of Ecuador. At left, Dale Calder's voyage around the islands is indicated in black.

DALE CALDER

prene suit. I was beginning to feel my 60 years. Aboard the inflatable that would carry us to the dive site, we donned fins and gloves and cleaned our masks. One of the crew, Vladimir, operated the boat, staying in the vicinity to pick us up when the dive was over. He ran us from the *Beagle* to the base of the largest of the three rocky pinnacles, just enough time for us to catch our breath from all the preparations.

There, we flopped over the side and headed for bottom, relieved of the considerable weight and discomfort we felt while out of water. What a difference! All that gear began to work for instead of against us, protecting against heat loss and allowing us to breathe and move efficiently underwater.

The pinnacle we were sampling, shaped like a steep inverted cone above and below water, was marked by irregular rocky ledges, crevices, and shelves. On this dive we swam straight down to a depth of 24 metres (80 feet). Checking the rocky wall briefly to see what was growing there, we decided to descend another 3 metres (10 feet) or so before beginning our sampling. Each time I equalized pressure on the way down, my ears squeaked.

Cleve Hickman promptly set to his primary task of underwater photography with the help of Fernando, an Ecuadorean graduate student working at the Charles Darwin Research Station, known in Spanish as Estación Cientifica Charles Darwin. Diving with me and helping me collect was Californian Lauren Garske, a volunteer marine biologist at the research station. A superb diver, she also helped Fernando keep SCUBA tanks filled during the trip. Daphne Fautin had gone ashore on Pinzón to look for sea anemones in the intertidal zone, where they were abundant, and was not making this dive.

Lauren and I were looking for hydroids. Right away we found one that we had not seen on any of our previous dives.

PAUL HUMANN

It was, quite likely, a species new to science. If the adrenalin wasn't flowing before, it was then. Using my diver's knife, I dislodged a few colonies from the upper surface of a rocky shelf, placed the specimens inside my collecting bottle, and replaced the lid. We were careful not to over-collect nor to disturb the environment, for we were in a national marine park. Our permits allowed collecting for scientific purposes, but sampling had to be judicious and justifiable.

After clearing water from my mask and checking my depth gauge, it was back to the search for other species. We looked at a variety of surfaces—including rock, black corals, sea fans, sponges, algae, echinoderms, barnacles, other hydroids—to see whether hydroids might be growing on them. Perhaps as many as a dozen different species were to be found on this dive. Down here, my near-sightedness offered a few advantages. One was that, having to look at close

Examples of hydroids found in the Galápagos:
Left to Right: *Pennaria disticha; Macrorhynchia philippina; Aglaophenia sp.*, a species new to science.
Inset: Daphne Fautin sampling for sea anemones ashore on Isla Santa Cruz.

What Makes the Galápagos Waters So Cold?

DAPHNE FAUTIN

THOUGH THE SEA AROUND the Galápagos Islands lies directly across the equator, oceanic circulation patterns in the area make the waters subtropical or even temperate, rather than truly tropical. In most places, a cold-water wetsuit is certainly needed to dive comfortably, and I purchased a new one for the trip, replacing lighter ones I had used on previous field trips in Bermuda, Belize, and Brazil. Two essentially temperate ocean currents, converging from different directions, bathe the Galápagos with waters that can be surprisingly cool. Flowing from the east is the South Equatorial Current, while approaching from the west is the Equatorial Undercurrent (also known as the Cromwell Current).

In spite of its name, the South Equatorial Current is relatively low in temperature because of inflow from two cold ocean currents that move northward along the west coast of South America. Even cooler is the Equatorial Undercurrent—as cold, deep waters collide with the undersea pedestals of the westernmost Galápagos islands and rise to the surface, they lower sea-surface temperatures. Biologists attribute the unexpectedly high fertility of waters around the Galápagos to a high level of nutrients in these cool, upwelled waters.

Just as the Galápagos Islands above water are not the stereotypical palm-fringed paradise you might expect of a south Pacific archipelago, surrounding waters are much cooler and biodiversity is much more limited than in truly tropical areas such as Australia's Great Barrier Reef or the coral reefs of the Philippines.

As well, the marine climate of the Galápagos shifts drastically every few years as a result of major and widespread changes in atmospheric circulation known as El Niño or ENSO (El Niño-Southern Oscillation) events. During these events, a high-pressure system normally dominating the eastern Pacific gives way to low pressure; rainfall increases significantly and the region's trade winds weaken. Warm surface waters from the tropical western Pacific then flow eastward across the ocean, displacing typically cool waters around the islands. More information on ENSO and atmospheric and oceanographic phenomena, which are far too complex to adequately summarize here, can be found on Web sites such as that provided by the National Oceanic and Atmospheric Administration (http://www.pmel.noaa.gov/toga-tao/el-nino/nino-home.html).

range, I was able to see tiny species that might otherwise escape notice. Another was my inability, while nose-to-the-rocks, to see and be distracted by patrolling sharks.

From our starting point 27 to 30 metres (90 to 100 feet) down, the four of us began a gradual ascent, looking for and collecting a variety of invertebrates as we went. Each pair of divers worked within sight of each other, although sometimes all we could see were exhaled air bubbles rising from behind a crevice or boulder. Like the changing bands of vegetation up a mountainside, differing zones of plant and animal life were easily visible on our rocky pinnacle as we slowly rose toward the surface. Two species of black corals conspicuous near the bottom disappeared as we came up, giving way to greater numbers of octocorals, or sea fans. We checked our gauges from time to time to keep track of depth and air pressure and to monitor the length of time we'd been down. As we worked, curious sea lions swooped around us, and a sea turtle slowly swam by.

In the upper 9 metres (30 feet) or so, two species of large stinging hydroid (*Pennaria disticha* and *Macrorhynchia philippina*) became increasingly apparent on hard surfaces. The water was warmer up here too, 22°C compared with 20°C at 27 metres (90 feet), and there was more light. Algae became more prevalent and varied. A short distance below the surface, the rocky walls were covered with clusters of huge acorn barnacles. On this dive, unlike some of our earlier ones, the water currents and the surge of ocean swells were weak and we found it easy to work. Finally, after about 40 minutes, with my tank pressure down to 500 pounds per square inch from 3000 at the start, I signalled that I was finished and was going to the surface.

Once I was up, Vladimir motored over in the inflatable and hauled my sample bottles, weight belt, buoyancy com-

Conservation on the Galápagos Islands

The Charles Darwin Research Station

DALE CALDER

GIVEN THE DISTINCTIVENESS, significance, and extreme fragility of the Galápagos environments and native wildlife, conservation is critically important in the archipelago. In 1959, the government of Ecuador set aside lands, excluding areas already settled by humans, as a national park. In 1978, the islands were designated a World Heritage Site by UNESCO. Then, in 1998, Ecuador extended protection to surrounding waters by establishing the Galápagos Marine Reserve.

Working together, the Galápagos National Park Service and the Charles Darwin Research Station are making extraordinary efforts to protect and preserve the local environments and native plants and animals. A major thrust of their conservation work involves preventing non-native species from being introduced; the service has already been successful in eradicating some destructive introduced species. The baseline data gathered from our own research trip will be useful to these conservationists. Knowing precisely what is now living in the Galápagos waters will help them to recognize future invasive—and potentially harmful—species.

Last year, the area was fortunate in that a near-disaster was largely averted when oil spilled from the wrecked tanker *Jessica* was carried away from the islands and into the open sea by winds and ocean currents. But centuries of human contact have already taken their toll: the extent of ecological change and habitat destruction is substantial, both above water and below.

Listed as "vulnerable" by the World Conservation Union, the islands' namesake Galápagos tortoises are down to only 15,000 from an estimated 250,000 when the islands were discovered in 1535. Four of 15 subspecies have already disappeared.

Finding an appropriate balance between preserving the environment and allowing residents access to resources can be tricky politically. Fishermen and conservation workers are now clashing over the already overexploited fishery of sea cucumber—a relative of starfishes and sea urchins, and a delicacy in parts of Asia. Poaching, some of it by non-Ecuadoreans,of sharks and lobsters is an ongoing problem. Eco-tourism and recreational diving, which have become vital to the local economy, are strictly regulated to minimize negative impact. But with the human population expanding and numbers of visitors on the rise, concerns about pollution and habitat loss are bound to increase.

The Galápagos Islands and the peculiar assemblage of species native to them are unique and irreplaceable. The struggle to safeguard this spellbinding part of our planet is well worth continued effort.

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pensator, and SCUBA tank onto the boat. Thus unloaded, I scrambled aboard. Cleve was up next, followed by Fernando and Lauren. A short jaunt back to the *Beagle*, and we were quickly underway for a four-hour run back to the Darwin Research Station. En route we labelled, preserved, and stowed our samples, packed our gear, changed into dry clothes, and prepared for breakfast. Our week on the water aboard the doughty little research vessel passed quickly. The collecting was good; regrettably, it was over all too soon.

Back in my lab at the ROM, the process of sorting and identifying the newly collected hydroids and adding them to the database is still in progress. Already, my ROM colleagues and I have documented about 100 species of hydroids from the Galápagos area—some of the specimens are new to science. Predictably, the overall group seems most closely related to the fauna of the adjacent coast of South and Central America. Most of the species we found in the Galápagos were likely introduced from there long ago, rafting over on flotsam. The wide stretch of ocean is less of a barrier to colonization for marine life than for terrestrial plants and animals. That's why there are fewer marine species than terrestrial ones that are endemic to the Galápagos. As we expected from the relatively cool waters of the islands, certain hydroids that flourish in tropical areas of the Pacific are absent here—fire corals are a prime example. Instead, dozens of typically warm to temperate species were among those collected. With scientific names as exotic as the islands they inhabit—*Turritopsis nutricula*, *Cladocoryne floccosa*—each comprises an important part of the web of life around the Galápagos.

This work on a tiny part of the Galápagos Islands's living ecology is one more step toward better understanding the remarkable archipelago that so inspired Charles Darwin. •

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THE MAGAZINE OF THE ROYAL ONTARIO MUSEUM

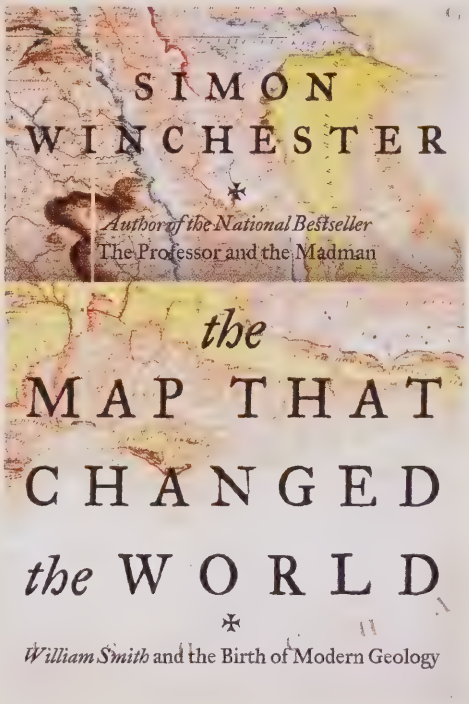
Stars, Strata, Shields

FEATURE REVIEW

The Map That Changed the World: William Smith and the Birth of Modern Geology

By Simon Winchester
(HarperCollins, Cloth: $39.50)

Born in 1769 in a cottage on the edge of the village green in Churchill, Oxfordshire, William Smith evinced an early interest in the geological and palaeontological world around him. He noticed, for example, the uniformity of shape and weight of the fossilized echinoid *Clypeus ploti*, referred to in the area as pound stones and used as weights for butter scales on local dairy farms. The marbles that William and his friends played with were in fact a kind of brachiopod. In his diary he wondered about the remarkable whiteness of chalk, reflected that there were no stones around Churchill on which he could sharpen a knife or strike a spark, marvelled that some of the neighbouring farmers used a local blue clay to tint their barns instead of painting them. He stood enraptured at a swath being cut through the Chiltern Hills, near Henley, to make a road. (In later years his garrulous obsession with the topic of geological stratification led to his nickname, "Strata" Smith).



As a young man, working as a surveyor in coalfields near Bath, he observed that the sequencing of deposits was constant in each of the mines: descending vertically, sandstone, siltstone, mudstone, non-marine band, marine band, coal, seat earth, and then the order was repeated. The pattern was ubiquitous. This led ultimately to his epochal *Delineation of the Strata of England and Wales with Part of Scotland*, of 1815, more than eight feet tall and six feet wide, the world's first geological map. Like seismic shocks, its implications reverberated to everything from Darwin to diamond mines, from the origins of life to making a living.

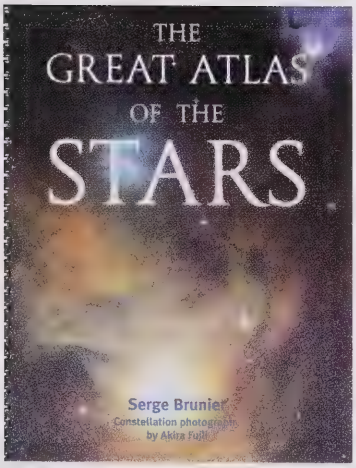
Its creator's personal life, however, was not ordered by the predictable geometry of earth science: "Four years after the map's triumphant publication, and with his young wife going steadily mad to the point of nymphomania, Smith ended up in debtor's prison, a victim of plagiarism," ultimately a victim of social stratification—a cruel and absurd irony. On the day of his release, his home was repossessed: "The burly sentry took up a stance with his arms folded in front of him, brooking no argument. William Smith, beaten down yet again, but now determined not to suffer the indignity of confrontation, turned away."

Fortunately and circuitously, he became the recipient of honours and accolades, was summoned to receive the Geological Society of London's highest award, and was granted a lifetime pension by King William IV. His last years were spent in halcyon retirement at Scarborough, Yorkshire, where he helped to found a museum, itself a rotunda in the Doric style, in which fossils were displayed in accurate chronological order and relative position.

Winchester writes superbly. As a publisher and editor, I observed also that the book is prodigiously well edited. No wonder. Leafing to the credits, I discovered that the work had the benefit of three substantive editors, two copyeditors, and the author's entire writing class at the University of Chicago as proofreaders.

The Map That Changed the World is also available on cassette and CD from HarperAudio.

COMPILED AND REVIEWED BY GLEN ELLIS



The Great Atlas of the Stars

By Serge Brunier, Akira Fujii
(Firefly, Paper: $49.95)

"By this the Northerne Wagoner had set
His sevenfold teme behind
the stedfast starre
That was in Ocean's waves yet never wet
But firme is fixt and sendeth
light from farre
To all who in the wide
deepe wandring arre."
—Sir Edmund Spenser, 1596

Historically, time could be measured by the apparent progress of the stars across the sky, the relative positions of stars and constellations like hands on a clock or an LED display. For sailors, the directional "stedfast starre" (Polaris), never optically dipping below the horizon (and therefore "never wet"), could thus also be, in its relationship to northerly constellations, a guide to the hour.

The Great Atlas of the Stars, although selective, comprises the brightest constellations and most beautiful stars and celestial bodies, from Andromeda to Venus. What distinguishes this work especially is the very large format astrophotography with overlay acetate delineations of the constellations, enabling the stargazer to shift quickly from vast starfields to pinpoint geometrical representations. The *en face* information includes best season for viewing, the constellation's history and features, principal stars (plus their respective luminosities and distances), clusters, nebulae, galaxies, and minimum requirements for observation (naked eye, binoculars, telescope, observatory). It also includes mythology and lore. The clockwork annual reappearance of Sirius, for example, inspired the ancient Egyptians' first calendar.

The astrophotographic imagery is rich, even opulent, rendered by astronomer/photographer Fujii from his observatories in the Japanese Alps (northern hemisphere images) and the Australian desert (southern hemisphere).

Firefly Books has become the premier Canadian source of popular and authoritative books about astronomy and stargazing. *The Great Atlas of the Stars* adds measurably to their list.

Shields: Africa, Southeast Asia and Oceania

By Jean-Paul Barbier, Alain-Michel Boyer, P. Benitez-Johannot
(HarperCollins, Cloth: $95)

Invented as a first line of defence, the shield evolved in world cultures to incorporate mystical properties, often deriving from potent iconography that imbued it with at least psychological counteroffensive prowess. So much so, that the shield became "an object for ostentatious display in which communication is achieved through aesthetic power," a staple of the warrior's personal adornment in his effort to "dress for success." Sometimes it was the only adornment—or cover. Except for their shields and torques, the Gauls fought naked. Legions of *Dying Gaul* sculptures confirm the inefficacy of the defence. For the knights of medieval jousts, their visages obscured by helmets, the shield served as a heraldic nameplate. In some cultures, magic could be infused by shamanistic figures. In an early 20th-century photograph, Kanukubusi, "The Last Wizard of Kiriwina," demonstrates his techniques for charming shields in a still-earlier time.

Shields illuminates this *objet de guerre* from makeshift and utilitarian armour to elaborately ornamented museum *objet d'art.*

Glen Ellis is head of Publications, Royal Ontario Museum.

"Living" Fossil's Ancient Relative

Fossil fragment dates to a time when North America was covered by a shallow tropical sea.

Dear ROM:

Hi. My name is Giulia and I am 8 years old. I found this fossil (top right) in the ravine at the far end of my backyard. I have some questions about it. Can you help me answer them? What is the name of this fossil? How old is it exactly?

What kind of rock is it in? Oh no! The rock is falling apart. How can I help my fossil survive? What is it doing in my backyard?

Are there many in Ontario? Was the Earth covered in water when this fossil was alive and what did it look like when it was alive?

G. S. R.

Dear G.S.R.,

Your fossil is part of the shell of a nautiloid cephalopod called *Geisonoceras tenuistriatum*. Nautiloids are ancient relatives of squids, octopus, and the modern-day chambered *Nautilus*. As it grows, the shell of the modern nautilus coils around itself, whereas your fossil is straight. The shells of both animals are divided into chambers by walls called septa. A soft, squid-like body occupied the broader, open end of the shell. The other end of the shell tapered to a point.

The modern-day creature *Nautilus*—one member of the larger group of nautiloids—is sometimes called a "living fossil" because its shell is very similar to fossils hundreds of millions of years old. In fact, being able to observe a living animal with this type of shell helps us to understand the strange chambered shells—coiled or straight—that are so often found as fossils. We know now that these chambers give the shell strength and help to control its buoyancy in the water. You can see traces of the septa in your fossil, marking the length of the shell into regular segments.

BRIAN BOYLE, ROM

54481

Top: G.S.R.'s fossil.
Bottom: *Nautilus pompilius* shell cut to show the internal chambers. Uncoil it in your mind to get a straight nautiloid like G.S.R.'s.

JANET WADDINGTON

During the Late Ordovician Period, about 455 million years ago, your fossil swam in the sea. Back then, the North American continent straddled the equator, and much of the continent was flooded by a shallow inland tropical sea. When the nautiloid died, its soft body was eaten or rotted away (eaten by bacteria), and the shell sank and was buried in mud on the sea floor along with the shells and hard remains of countless other creatures. Over time, thousands of metres of sediment accumulated over the buried shell, altering and compressing both shell and sediment in the process. The soft mud enclosing the shell became hard shale.

Between that time and now, North America drifted to its present position north of the equator, and most of the continent rose above water. Much of the rock overlying your fossil was eroded away by water and ice. The remainder was covered by sand, gravel, and mud left behind when glaciers from the last Ice Age melted. Finally, rivers etched their way through this latest accumulation of sediment and brought the rock containing your fossil back to the surface for you to find. The rocks of southern Ontario are full of the fossilized remains of creatures that lived long ago—our window on the past.

Watch for a future issue of *Rotunda* for tips on how to preserve your fossil.

Janet Waddington is an assistant curator in the Palaeobiology Department and oversees the care of the ROM's invertebrate fossil collection.

Marked by Mystery

Fine works of Art Nouveau from the turn of last century may reveal new information about a previously undocumented French foundry.

Dear ROM Answers,

I INHERITED THIS PIECE OF sculpture from a relative, who owned it for over 60 years before she passed away about 15 years ago. The name "Korschann" is impressed on the side with the word "Paris" below. The name on the side is printed in freehand lettering, so I am only positive of the beginning (Korscha . .): the last letter or letters could actually be an "m." The word "Louchot" is stamped on the bottom of the foot. Thank you so much for any information you can give me.

B. B., TORONTO, ONTARIO

Dear Reader,

Judging from the photographs and the marks you describe, your vase was cast about 1900–1910 at a French foundry apparently named Louchot and located in Paris. I'll discuss this in more detail later. The sculptor can be identified as Karl Korschann, born July 23, 1872, in Brno, Moravia (modern Czech Republic). Korschann, like many non-European artists who were known by alternative Italian, German, or French versions of their names, is also called Charles Korschmann. He studied art at the academies in Vienna, Berlin, and Paris, where he first exhibited at the *Salon des Artistes Français* in 1894. Korschann's work earned a bronze medal at the Paris *Exposition Universelle* in 1900. In 1913, his art—which by then included medals, busts, and other sculpture—was exhibited at a retrospective in Frankfurt. By 1919, he had returned to Brno to teach at the art school.

BRIAN BOYLE, ROM

PETER KAELLGREN

Most of this information comes from Ulrich Thieme and Felix Becker's *Allgemeines Lexikon der Bildenden Kunstler von der Antike bis zur Gegenwart* (Leipzig 1927; vol. 21, p. 324). I was not able to find any information for Korschann after 1919. He may have spent most of his later years teaching.

B.B.'s Sculpture: This piece stands 5-3/4 inches (14.7 cm) tall and is a little over 4 inches (10.1 cm) wide at the base.

According to the new edition of Bénézit's *Dictionnaire* (edited by Jacques Busse, Paris: Editions Gründ, 1999; vol. 7, p. 951), Korschann's small statues are characterized by the gracefulness of the period—around 1900. I have never before seen a piece by Korschann and did not find a single one illustrated in any of the books I consulted. It is interesting, then, that *Les Arts Décoratifs 1890–1940* (edited by Philippe Garner, Paris: Bordas, 1981, p. 98) lists Charles Korschann among the most significant creators of Art Nouveau decorative sculpture.

Your Korschann vase is certainly above average. What distinguishes it is the rendering of the faces. The full-figure nude looks as though she is saying something or reacting to her friend among the chestnut leaves. Most Art Nouveau maidens have a placid appearance ranging somewhere between indifference and a tranquilizer-induced high.

The naturalistic decoration and nudes on your piece are like much other Art Nouveau, but the basic form—a club vase with six flat panels running up the sides—is out of the ordinary. Such strict geometric forms often characterized the more innovative Art Nouveau pieces,

anticipating the fully developed Art Deco of the 1920s.

Fortunately, you were able to bring the vase in for photography and I verified that it was of good quality cast bronze rather than the grey zinc alloy known as spelter used for so much commercial Art Nouveau sculpture.

I identified the foundry as "Louchot" based on two Art Nouveau pieces from the ROM's own collections (see "Louchet at the ROM," below). One of these is clearly stamped "Louchot" on the bottom—as is yours—and the other is stamped with the words "Paris/Louchet/Ciseleur." A *ciseleur* is the highly skilled craftsman who uses chisels and tools on cast bronze to refine the details and create texture on the surface. The identity of Louchot, or perhaps Louchet, however, is problematic.

At one time, I thought I had seen the name Louchot Frères (Louchot Brothers). The 1999 edition of *Bénézit* (vol. 8, p. 818) describes Paul Louchet (1854–1936) as a painter. However, the entry—translated from the French—includes the following: "Initially interested in the technique of fine metal finishing, [Louchet] was made president of the association of bronze workers, then he devoted his efforts to painting."

Louchet at the ROM

Two Art Nouveau objects in the ROM's own collection, both porcelain set in bronze mounts, are marked by the artist Louchot or Louchet. The first is a vase with a streaky glaze, mounted at the upper side with a nude bronze woman with part of an iris blossom on her head. Set on a green onyx base with flowing water motifs, the piece has frogs as feet. The ceramic part of the vase is unmarked, but one of the frogs is clearly stamped "Louchot" on the bottom. The vase was acquired by a family from South Africa who travelled in Europe in the early 1900s.

The second piece, an *encrier* or ink stand with a pen tray and two ink wells, is mounted on a thick sheet of gilded bronze. The pen tray is moulded along the front of an oblong porcelain base, in which the ink wells are set. The glossy glaze, spotted in green and blue with dashes of brown, suggests some kind of stone and imitates glazes associated with the celebrated French potter Bernard Palissy (c. 1510–c. 1590) or with French porcelain around 1790/1800.

The borders and trim are moulded in low relief with flowering nasturtium vines, and there is a band of linear Celtic motifs between the two ink wells. All of this is covered in a rich matte gold, made to look like the bronze. At the back of the ink wells is a small disk of similar gold colour, lettered in three lines "Paris/Louchet/ Ciseleur." In the early 1900s, luxury ink stands and other desk accessories such as letter openers were high-status products, often carefully designed and crafted. The overall flowing shape and the decoration on the ink stand follow the Art Nouveau style.

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BRIAN BOYLE, ROM / 987.17.1

Top: This *encrier* (desk ink stand), is of glazed and gilded porcelain with bronze mounts. French, Paul Louchet, Ciseleur, Paris, c. 1900–1910. Length: 17 inches (43 cm). ROM collection. Gift of Bernard and Sylvia Ostry.

Bottom: This vase is glazed ceramic with bronze mounts set on an onyx base. French, metal foot stamped "Louchot," Paris, c. 1900–1910. Height: 10-3/4 inches (27.4 cm). ROM collection. Gift of Mrs. Basil Katz.

The list of paintings that completes the entry includes a dresser tray for jewellery and watches, which was sold at an auction in Brussels in October 1984. Entitled *The Ship Wreck*, this item is made of ceramic mounted in gilded bronze as are the two pieces in the ROM's collection. Allowing for the different spellings of the artist's name, it appears that Paul Louchet and Louchot may be one and the same individual who either owned and/or operated a foundry or finished works cast to order from a skilled French foundry. It would be very helpful if further evidence were to turn up.

The high quality of your vase and the two ROM pieces suggests that this artist or firm is one that is well worth investigating. Thank you for sharing your heirloom with our readers.

PETER KAELLGREN

Peter Kaellgren is a curator in the ROM's Department of Western Art and Culture, specializing in British and European decorative arts from 1500 onward.

WE'D LIKE TO HEAR FROM YOU

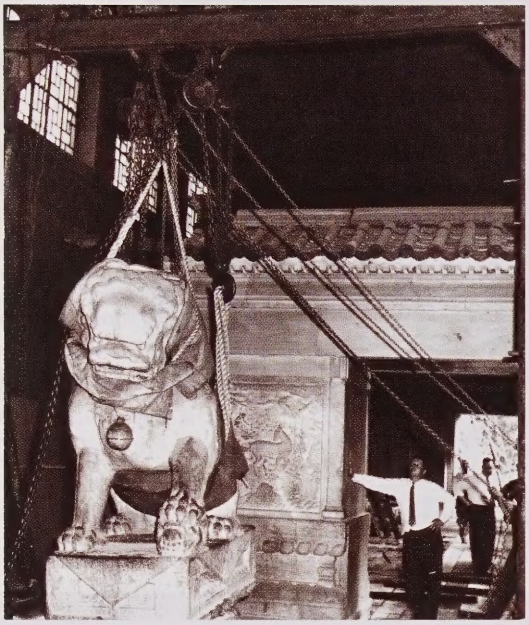
If you own furniture, silver, glass, metalwork, ceramics, textiles, or small decorative objects that may have an interesting past and have aroused your curiosity, this column is for you. Send a clear colour photograph (or 35-mm colour slide) of the object against a simple background, providing dimensions, a description, any markings, or any known details of its history to: ROM Answers, c/o *Rotunda* Magazine, Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario M5S 2C6. Be sure to enclose a stamped, self-addressed envelope large enough to include any photos that must be returned to you.

Neither *Rotunda* nor the author nor any other person who may be consulted assumes any legal responsibility for these opinions or their ramifications. No financial appraisals will be offered.

Letters will be acknowledged as staff time permits.

RESTLESS STONE

Since arriving in Toronto, the ROM's pair of Chinese lions haven't stayed in one place for long.



ROM ARCHIVES

One of a pair that guards the Museum's terrace galleries facing Bloor Street, this 17th-century *shi shi*, or stone lion, was transported with its mate from Beijing, China, in 1923.

At first, the lions were ensconced in a gallery, since demolished, where Weston Hall stands today. In 1959, they were moved outdoors, as seen above, where they remained until 1981. Then, they were again brought inside, guarding the entrance to the Chinese galleries. The difficulty was that outdoors, the lions suffered the indignity of plastic covering in winter. Indoors, the floors must bear their 17-ton weight.

When the Eaton Court opened in 1989, the lions were returned to the front lawn. Logs and trestles like those in the photo from 30 years earlier were again used. This time, though, the lions' progress was broadcast on television. Now, with our Master Planning process underway, another move is imminent.

The lions' journey from Beijing is documented in the Summer 1992 issue of *Rotunda*.

JULIA MATTHEWS

Julia Matthews is head of the ROM's Library and Archives.

If you remember an occasion at the ROM or an exhibition that has stayed with you across the years, send us your reminiscences at info@rom.on.ca.

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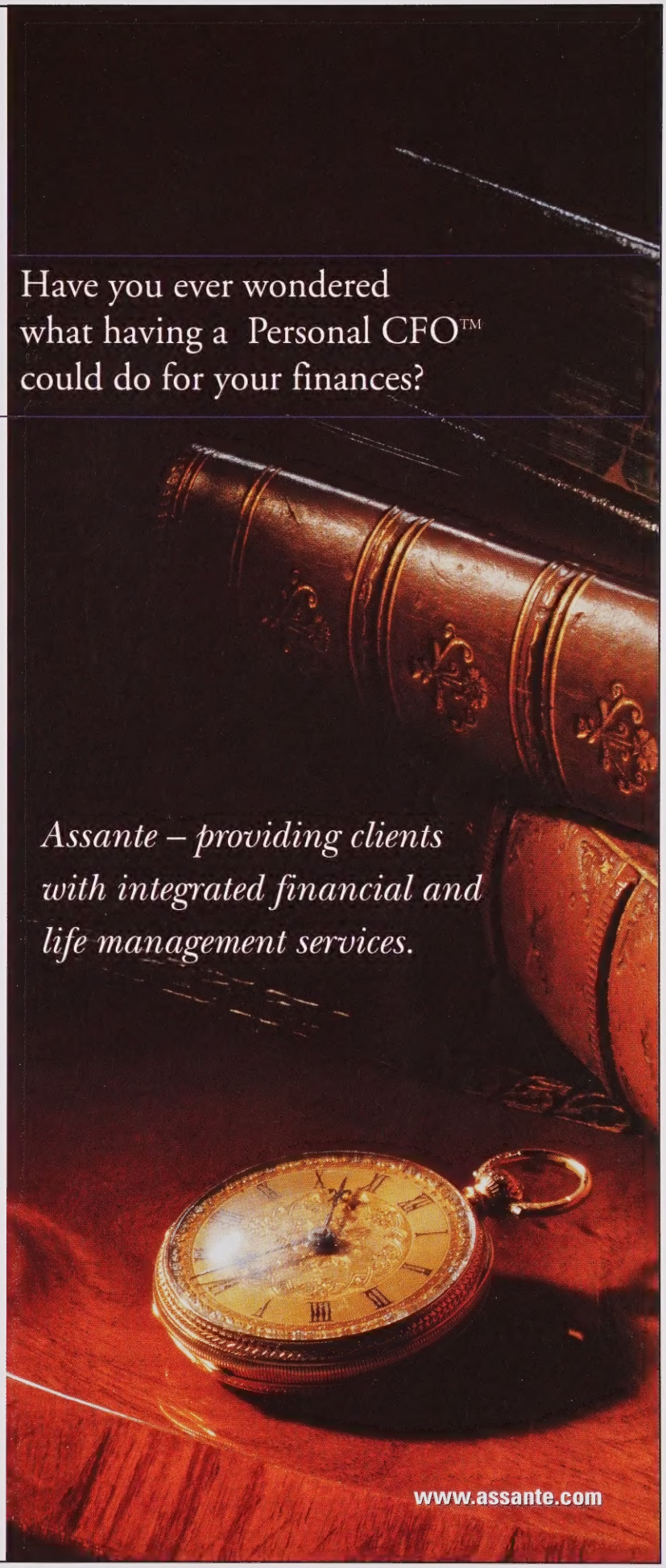

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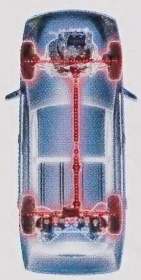

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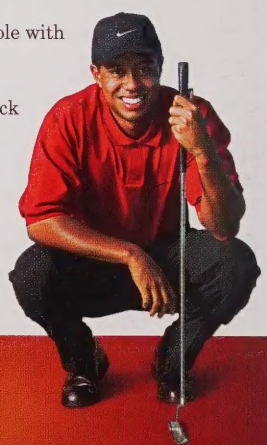

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